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General Articles

THE PROBLEM OF "RHEUMATIC DISEASE"
(Osteo-arthritic and Allied Conditions)
IN THE HORSE*

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The commonest disease from which the horse suffers in this country is not one which causes sudden death but one which is associated with many crippling and disabling conditions. These conditions diminish the value and usefulness of the horse and in many ways necessitate his premature destruction. A large amount of the cost of horse power arises from loss of work and the too frequent replacement of incurable cases due to these conditions, and breeders of draught horses in particular should keep in mind that such disease factors play a large part in the supplanting of the horse by the motor.

Up to the present nearly everybody interested in horses regards these various crippling and disabling conditions as distinct separate diseases, whereas, in my opinion, the majority are all merely local manifestations of one general disease, a disease akin to the so-called "rheumatic diseases" which affect the human race, particularly in this country.

The various rheumatic joint and bone conditions in man have equivalents in the horse such as ringbone, spavin, splint, bog-spavin, spondylitis and other less frequently recognised joint troubles. It is a fact that in the course of *post-mortem* work I have seen typical evidence of "rheumatic disease" in every joint or bone of the body of the horse. Such human complaints as the various forms of neuritis, of which sciatica and lumbago are two of the best known, are represented in the horse by shivering, stringhalt and jinked back, and in addition we have, as common conditions arising probably from neuritis, grunting and roaring.

This is the first time I have used the term "rheumatic disease" for these various conditions of the horse and I have done so as the term "osteo-arthritis" appears to limit the disease to bones and joints and is therefore too narrow in its scope.

Some day, I hope in the not too distant future, the term "rheumatic disease" will disappear and the disease will be named more in accord with its true cause.

In the limited time at my disposal it is my intention, firstly, to give you very briefly a general description of the disease process as it affects the horse at different age periods and, secondly, to discuss some possible nutritional factors which may cause the disease.

For descriptive purposes I will consider the disease under three heads:—

(1) "Rheumatic disease" from one year old onwards.

(2) "Rheumatic disease" in ante-natal life.

(3) "Rheumatic disease" in post-natal life up to one year old.

"RHEUMATIC DISEASE" FROM ONE YEAR OLD ONWARDS

For a number of years I have been investigating this disease and as the youngest horse I have been able to examine fully on *post-mortem* was one year old, this accounts for one of the arbitrary dividing lines in presenting this description of the disease.

Post-mortem examinations have been made of horses over one year old which have been destroyed on account of various disabilities such as shivering, partial paraplegia (jinked back), navicular disease, ringbone, and numbers of these horses, particularly shiverers, had other definite clinical conditions at the same time such as grunting, sidebones, bog-spavins, splints, ringbones and irregular heart. In addition, many partial examinations have been made of horses slaughtered for food purposes at the Scottish Zoological Park, and "rheumatic disease" has been found to be very common.

Now no matter for which of the above-mentioned conditions a horse was destroyed, the *post-mortem* findings were very much alike. Naturally the clinical condition recognised during life generally showed an advanced amount of structural change corresponding to it, but the surprising thing has been the discovery of marked changes in various widely situated parts of the body never suspected of being diseased during life.

Joints and bones suffer throughout the body; in old horses practically every bone and joint

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may be affected, though the disease process is not equally active in all the various parts at the same time. Even in a single joint active disease may be present in one part, in another part a healed lesion may be found, and in still other parts there may be no sign of disease. It is in older horses that signs of repair are often well seen and many of the enlargements we recognise about joints in horses which are not going lame are the result of nature's effort at repair.

Next to bones and joints, the peripheral nerves, especially those going to the limbs, have been found to show marked alteration from the normal in all cases, but in horses where nervous signs were present clinically, *e.g.*, shiverers and cases of partial paraplegia, the most grossly damaged nerves (peripheral polyneuritis) have been found.

This damage to nerve fibres when gross, as in shiverers, interferes with the smooth functioning of muscles and we get the characteristic tremors and spasmodic action of muscles which we recognise clinically.

In horses which are grunters there is a partial atrophy of intrinsic muscles of the larynx, which I have demonstrated in four cases by dissection, thus leading to some loss of control over the vocal cords. There is reason to suspect that this atrophy may arise from a limited amount of peripheral neuritis affecting the recurrent laryngeal nerve; if the damage were more severe the horse might be a roarer. It does not necessarily follow that a horse which is a grunter will develop into a roarer; if "rheumatic disease" should become active the horse which is a grunter may just as readily show clinical signs of some joint condition such as ringbone or spavin.

The great frequency of marked signs of polyneuritis on microscopic examination of peripheral nerves inclines me to the belief that some of the sprains of tendons and joints in the limbs are predisposed to by loss of muscle tone secondary to damage of the nerve supply to muscles.

Though joints, bones and peripheral nerves are the tissues most commonly showing pathological change, there are various other tissues of the body which show alteration from the normal. Chief among these are the lymph glands, which are enlarged; one also finds fibrositis of the terminal portion of the œsophagus and gastric ulcers affecting the œsophageal portion of the mucous membrane of the stomach.

In a previous paper I have gone more fully into the nature of the disease process, pointing out how the abnormal changes in joints, bones, nerves, lymph glands, etc., are all of the nature of a fibrositis depending on a deviation from the normal circulation due to some as yet unknown factor acting on the arterioles and capillaries and causing vasodilation. The possibility that many of the bone and joint conditions may be secondary to irritation of sensory nerve fibres, because sensory nerve fibres are also the vasodilator fibres, is another aspect of the disease process which may be of importance and further significance of the nerve lesions may become clearer when I deal with etiology later.

"Rheumatic Disease" in Ante-natal Life

The life of a foal begins eleven months before it is born. The ideal conditions for a healthy living foal at the termination of pregnancy are that it should be bred from two healthy parents and should be maintained in a healthy environment *in utero*.

During these eleven months growth of the foal is rapid and is wholly dependent upon nutriment derived through the diffuse placenta. Now we know how common "rheumatic disease" is in the adult horse and it has already been pointed out how widespread disease lesions may be and how all these abnormal changes appear to be brought about by some harmful agent acting through the blood stream.

Does it not seem reasonable to expect that a foal in the uterus of a mare suffering from active "rheumatic disease" may also suffer? The same harmful agent which causes lesions in joints, bones and nerves of the dam is likely to affect the capillaries of the maternal placenta and thus the nutrition of the fœtus is likely to be affected. It is possible in this way to account for many of the unfortunate occurrences which affect a pregnant mare and her fœtus. At one end of a series of misfortunes we may have abortion of an early embryo which may escape notice, and the mare may wrongly be considered sterile. At the other extreme may be placed the foal apparently born healthy and up to time, but which may already have early hidden disease. Between these two extremes, factors causing disease may be at work, sometimes actively and continuously, at other times intermittently. When the process is very active it may lead to death of the fœtus at any time, and abortion may soon follow or, should the foal die near the end of pregnancy, the dead foal is considered a greater misfortune than an early abortion.

Instead of a dead foal, a living foal may be born which may show abnormal weakness and be unable to rise to its legs and suckle and so eventually perishes.

Though these are well-recognised states of ill-health of the foal occurring *in utero* there is every likelihood that just as horses reveal evidence of hidden disease or healed lesions, particularly in joints, so foals may have their periods of illness and recover. Such possibilities may become clearer when more is known

about the possible etiological factors and the stage of experimental research is reached.

The orthodox way of regarding abortions and weakly foals at birth as a result of varying degrees of uterine infection may only be half the story. Is it not possible that the vitality of the uterus itself is lowered by the unknown harmful agent acting on the uterus through the circulation, thus permitting infection to gain a footing in the mucous membrane?

"Rheumatic Disease" in Post-natal Life up to One Year Old

The condition known as joint-ill, which is the most dreaded disease of the newly-born foal, is one about which there is still much to learn regarding its prevention and if we can solve this problem with certainty, then we will be well on the way towards solving many of the other disease problems which occur later in life. The fact that micro-organisms are constantly found in this condition has served in the past to lead many to regard joint-ill as a definite specific disease, but the disappointing results achieved with vaccines and sera in its treatment are probably due to failure to appreciate the faci that even an apparently healthy foal at birth may be suffering from depreciation of its body tissues as a result of some failure in nutrition when *in utero*. Upon the degree of such depreciation may depend the acuteness of the attack of joint-ill.

From birth to one year old the chain of events in the disease process is built up from clinical experience alone as *post-mortem* examinations have not been available. At varying intervals after birth, sometimes weeks, sometimes months, such conditions of "rheumatic disease" appear as bog-spavin, distended stifle joints and thoroughpins—sometimes definitely connected with an attack of joint-ill, but in many cases there is no history of joint-ill. In some of these the swellings may disappear, but in most they remain permanently and form one of the local manifestations of "rheumatic disease" so common in the adult. Shivering also frequently starts during this age period, but the signs of the disease being very intermittent and the animal not as a rule under constant observation, it may be unsuspected until the animal first comes to be handled as a yearling.

SOME POSSIBLE CAUSES OF "RHEUMATIC DISEASE"

The Horse Breeding Acts, with their lists of scheduled diseases, have helped more than anything else to create the idea that heredity is of supreme importance in connection with disease causing unsoundness in the horse. These Acts, the outcome of the evidence given before the Horse Breeding Commission over 40 years ago, are founded on very incomplete knowledge of the pathology of the diseases scheduled. I prefer to regard them as localised conditions of this "rheumatic disease," but until a positive factor can be proved to cause these conditions, heredity will maintain its position of importance. I would ask those who still believe in this hypothesis of the heredity of these disease conditions in the horse to remember that all heredity required nurture for its expression and that a good environment, which includes nutrition, even with a doubtful heredity, may be better than a good heredity and a bad environment. It is easier to control environment than heredity.

The stealthy way in which "rheumatic disease" progresses, with many widespread changes in the structure of tissues before clinical signs of disease are suspected, and the failure of bacteriologists to demonstrate micro-organisms as the cause of the disease has directed attention to the important field of nutritional research as one likely to provide the clue to the mystery. It is my intention now to deal with some of the more likely nutritional deficiencies which may at least play a part in initiating "rheumatic disease."

Is "Rheumatic Disease" Due to an Excess of Phosphorus over Calcium in the Diet?

The importance of Ca and P in the diet of the horse has within the last few years come to be better understood, following investigations which have been made of the disease which Theiler calls osteofibrosa, but which is also known as equine osteomalacia, osteoporosis, big head and bran disease.

D. M. Campbell[1] has attempted to correlate the experimental work of Kintner and Holt[2] carried out on a large scale in the Philippines on equine osteomalacia and some investigational work by Greenlee in Indiana on the same disease with the work published by the present writer on the various conditions which to-day are grouped under the title "rheumatic disease." He says, "The type of cases investigated by Mitchell have not been shown to be due to mineral unbalance, but the bone lesions so closely parallel findings on osteomalacia as to raise a strong suspicion that they are but different manifestations of the same nutritional deficiency."

Let us examine the evidence of these American writers, who have succeeded in solving their own problem by experiments carried out on a large scale, though the pioneer experimental work of Sturgess in Ceylon, which first showed osteomalacia to be definitely due to a calcium-phosphorus unbalance must not be forgotten.

Osteomalacia in the Philippines appears to develop with great rapidity to the stage of facial lesions, sometimes within five months after

animals are landed on the islands. Early stages of the disease are marked by intermittent shifting lameness, and lameness is diagnosed frequently as spavin or ringbone lameness, arthritis, bursitis, rheumatism, etc. In the majority the first bone deformity to appear is a characteristic rounding of the superior border of the mandible lateral to the molar teeth. It is believed that this deformity is pathognomonic of osteomalacia in horses. In advanced cases bulging of the facial bones also occurred, hence the name "big head" for the disease. It was noticed that diseases affecting bones and organs of locomotion are more prevalent in Army animals in the Philippines than in like animals in the United States. The incidence of this group of diseases in the former showed a marked increase in 1924, approximately one year after a change of ration from imported to one composed largely of native feed. It was not until 1930-31 that osteomalacia was recognised as very prevalent in Army animals in the Philippines, accounting for 23·7 per cent. of all admissions to the sick and wounded report for a period of twelve months.

Analysis of the native feed revealed the fact that the $CaO : P_2O_5$ ratio was approximately 1 : 3. Experiments carried out on horses led Kintner and Holt to the definite conclusion that the disease exhibited by Army horses in the Philippines appears to be due solely to a mineral unbalance. Over a period of nine months horses fed on a ration in which the $CaO : P_2O_5$ was 1 : 1·9 showed no sign of the disease, but that the disease appeared to get progressively worse on a ratio of 1 : 2·2 or more.

There was no evidence that disturbance of internal secretion, parasitic infestation, heredity, infection or vitamin deficiency played any part in the production of the disease.

To prevent the disease, Kintner and Holt advised that the ration should be balanced in such a manner that the calcium oxide-phosphorus pentoxide intake ratio is between 1 : 1 and 1 : 1·8. This balance may be obtained by the addition of calcium to the ration direct or through its addition in the natural water supply. Following the institution of a new ration in June, 1931, there was a prompt and marked drop in the general admission rate for all causes other than infectious disease.

The observations of Greenlee and Beenan in Indiana quoted by Campbell also concerned Army animals where cases of "big head" occurred occasionally, but every sort of lameness not caused by external violence was prevalent to an abnormal extent, reaching its height in spring and being lowest in the autumn.

The ration consisted of timothy hay, oats and 1 lb. of bran daily and in some units 2 lb. of oil meal daily. The $CaO : P_2O_5$ ratio averaged 1 : 2·54. In the Philippines the ratio was 1 : 3 and more advanced cases of osteomalacia were more frequently met, and there was no seasonal difference in prevalence.

The difference in the $CaO : P_2O_5$ of the rations seems insufficient to account for the difference in effect, but Greenlee accounts for the difference by the fact that during the winter the horses drank an average amount of six gallons of water daily, whereas in summer they took approximately twice this amount, and he estimated that they got 2·5 gm. more calcium daily in summer than winter. Further, in the summer the horses were grazed and no oil meal or bran was fed, thus cutting out a considerable amount of phosphorus.

General reference is made to the *post-mortem* findings seen in animals destroyed because of the disease, and the joint changes appear to be very much the same as I have met in the course of investigation in "rheumatic disease" in this country, the presence of hidden lesions in joints without causing lameness being one striking similarity. Nerve trunk lesions and ulcers in the cardiac portion of the stomach have also been seen. Disappearance of stumbling, of the impaired gait, of the appearance of weariness and lameness—in fact, complete functional recovery, has occurred by reducing the $CaO : P_2O_5$ ratio from an average of 1 : 2·54 to approximately 1 : 1 by the simple and highly effective method of grazing as much as possible, cutting out the oil meal and bran and substituting alfalfa for the timothy hay.

In the light of such evidence it seems important to determine whether there is a calcium-phosphorus unbalance of the diets fed to horses in this country.

Linton[3] has shown the importance of utilising hay containing a reasonably high percentage of calcium in the winter feeding of dairy cows and gave an analysis of 41 samples of hay, chiefly of Scottish origin, to show how variable the calcium and phosphorus content is. Neglecting the first hay in the table of 41 given by Linton, which was admitted to be an over-ripe sample, it has been possible to work out the $CaO : P_2O_5$ ratio of a series of 40 different rations which varied in the sample of hay used, the oats being the same in all. Each ration consisted of 14 lb. hay (variable factor) and 12 lb. oats (constant factor). It is calculated that there is a range of the $CaO : P_2O_5$ ratio in 16 of these rations of from 1 : 2·1 to 1 : 2·7, with an average of 1 : 2·27. In the remaining 24 rations the ratio did not exceed 1 : 2, which is approximately the ratio below which Kintner and Holt were unable to produce osteomalacia in their experimental horses.

The ratio would, of course, be even more unbalanced if bran were used *in lieu* of part of the oats as is the custom in many stables.

There is certainly reason to suspect that a

calcium-phosphorus unbalance may play a part in the production of "rheumatic disease" in this country. It is difficult, however, to correlate the bone changes in osteomalacia, where the bones are lighter or more porous, with the heavy, dense bones of animals suffering from "rheumatic disease," with their numerous exostoses and the presence of bone in loose bodies, in joints and even in the heart muscle (one case). No swelling of the bones of the head has ever been seen in "rheumatic disease."

Is the Disease an Avitaminosis?

The branch of nutritional science which is concerned with the study of vitamins is of comparatively recent development, but already great advances have been made in our knowledge of these factors in foods which, when present, play an important part in maintaining health. Previous to this time it was well recognised that dieting of animals was of moment in the maintenance of health and restoring animals to health. One of the best examples is the beneficial effect upon horses suffering from rheumatic conditions, of two or three months at grass. Such benefits were appreciated by all interested in horses from the observation of the results accruing. It was not, however, until the experimental method came to be intensively applied in the testing of different foodstuffs that the various factors we now know as vitamins came to be recognised. Now, these experiments have chiefly been carried out on laboratory animals, guinea-pigs, rats, rabbits, dogs, etc., but so far little work has been done to determine whether the horse suffers from deficiencies of various vitamins in his diet.

In the course of work carried out on small experimental animals many of the foods on which horses live have been tested and the distribution of vitamins contained in them has been determined. The table drawn up showing the distribution of vitamins in foodstuffs, etc., is prepared from the extensive table given in a publication of the Medical Research Council[1] and includes most of the foods and supplements to diet likely to be used for feeding horses.

Looking through this table it will be seen that it is possible to supply a diet at all times which would contain a good supply of all known vitamins, but when we examine the common foodstuffs used for feeding horses, oats and hay, we find they are singularly deficient in vitamins, particularly A, D and C.

Vitamin D (Calcifying Vitamin)

This is the substance which has the specific function of controlling the deposition of calcium and phosphorus in the tissues. It should be kept in mind that the chief source of vitamin D is from direct activation of the ergosterol in the skin by sunlight, so that in this country at least a definite deficiency of this vitamin is likely to occur in horses during the winter, working in towns and often housed in dark stables. The importance of vitamin D in the production of "rheumatic disease" is, however, somewhat discounted by the fact that the disease occurs in countries where lack of sunlight is not likely, *e.g.*, India, Australia. In view of the doubt

Distribution of Vitamins in Foodstuffs, Etc.*

In this table O signifies that the vitamin has been tested for and not found, + that the material contains the vitamin, ++ that it is a good source of the vitamin, and +++ that it is a rich source of the vitamin. The values entered under the heading vitamin B refer to the complex "water soluble B," entries being made under vitamins B1 and B2 when these have been separately estimated.

Foodstuffs.	A.	D.	E.	B1.	B2.	B.	C.
Cod-liver oil	+++	+++	O to +	...	...	...	...
Linseed oil	O to +	O	...	...	...	...	...
Cereals—							
Barley, whole grain ...	+	...	...	++	...	+	O
Maize, white whole grain...	O	...	...	++	+	...	O
„ yellow „ „ ...	++	O to +	+	++	+	...	O
Oats, whole grain	O to +	O	+	+	...	+	O
Wheat bran	+	...	...	++	++	...	O
Linseed	++	...	...	...	...	+	...
Carrots, old raw	++	...	...	++	+	...	+
„ young raw	+	...	...	++	+	...	++
Clover	++	...	...	...	...	++	...
Hay	...	+	...	...	...	...	O to +
Lucerne (Alfalfa), dry ...	++	...	+++	...	...	...	...
„ „ fresh ...	...	...	+++	...	...	++	...
Swede juice	...	...	...	...	...	...	+++
Cabbage, green, fresh ...	++	...	+	++	++	...	+++
Pasture grass, summer ...	Corresponds to cabbage in vitamin content.						
„ „ winter ...	Particularly in hard winters is devitalized and therefore deficient in vitamin A.						

* Compiled from Appendix I, Vitamins: A survey of present knowledge. 1932. Medical Research Council. Special Report Series, No. 167.

concerning the metabolism of Ca and P, especially when these mineral elements are unbalanced, the close relationship of vitamin D in the metabolism of calcium cannot be altogether ignored, for it assists in securing the most economical utilisation of calcium in the diet.

Vitamin A (Anti-infective Vitamin)

A deficiency of vitamin A has for a number of years been suspected as one of the most likely factors associated with "rheumatic disease" in the horse. McCarrison's[5] striking experiments on rats, guinea-pigs, rabbits, pigeons and monkeys have been freely quoted in a previous paper, and as it is intended to bring forward other evidence in support of the likelihood of vitamin A deficiency producing disease in the horse, it will suffice to say that when McCarrison fed these experimental animals on ill-balanced diets containing little or no vitamin A a diversity of pathological conditions occurred, many of them similar to those met with in naturally occurring "rheumatic disease" in the horse.

In view of the exceedingly common occurrence of polyneuritis in the horse some recent experimental work by Mellanby[6] suggests it is possible that many of the joint, bone, gastric, œsophageal and other lesions in the horse may likewise be the result of interference with the neurotrophic control of these structures. He shows that nerve changes occur in the ophthalmic nerve in rabbits fed on a vitamin A deficient diet. The degenerative changes in early cases are confined to some of the medullated fibres of the nerve and affect the medullary sheath alone, the axis cylinders not being affected, though in advanced cases the latter also are involved. Mellanby suggests that the xerophthalmia, which has long been a recognised sign of vitamin A deficiency in experimental animals is secondary to the changes in the sensory nerve supply, the ophthalmic, and thinks it probable that other metaplasias of epithelial and mucosal surfaces throughout the body and subsequent invasion of tissues by micro-organisms are related to changes in their afferent nerve supply.

The experimental diet used was oats 4 parts, bran 1 part, calcium carbonate 1·5 per cent. Ten gm. alfalfa heated 36 hours at 120°C. to destroy carotene (vitamin A) are also given daily. Forty to 70 gm. of oats-bran mixture is given in increasing amount as the rabbit grows, but alfalfa is not necessarily increased.

Here is a diet closely resembling the regular diet of the horse, balanced, however, in Ca and P. In this experiment the vitamin A was destroyed, but it should be recognised that vitamin A is easily oxidised and destroyed, so the probability is that many of the hays fed to horses which have been slowly dried in the open, particularly in a wet season, are just as deficient as the alfalfa in this experiment.

Sutton *et al*,[7] experimenting with rats, have also noted the presence of degeneration in peripheral nerves in association with tissue changes in avitaminosis A. An interesting comparative point in their work is the degenerative change seen in the sciatic and femoral nerves before the earliest clinical signs of vitamin A deficiency disease develop. These are the two nerves in the horse which have almost invariably been found to show degeneration in "rheumatic disease."

The contention put forward earlier in this paper that abortions, premature births with dead or weakly foals are local signs of "rheumatic disease" does not appear to be so unreasonable as it probably did at first, in the light of certain results obtained by Meigs *et al*.[8] While investigating experimentally the effects on calcium and phosphorus metabolism in dairy cows, of feeding low-calcium rations for long periods, they found that when the calcium content of a ration is reduced by substituting timothy hay or straw for alfalfa the vitamin A content is also likely to be reduced and that the failures in reproduction, premature births with dead or weakly calves, which have occurred on rations in which the roughage was timothy hay or straw, are to be attributed to a vitamin A deficiency rather than to a calcium deficiency.

The liver is apparently the great storehouse for vitamin A and this probably accounts for animals being able to remain in perfect health for long periods after supplies of the vitamin in their food have been cut off.

When green food is fed, then an abundance of vitamin A is received and the store in the liver is replenished and in many animals this is apparently sufficient to maintain good health during the winter; in others the supply may be too little and disease is liable to occur.

The danger of the foal *in utero* not receiving a sufficient supply of vitamin A from the dam, when the latter is housed and fed wholly on hay, oats and bran, is great. Even the method of allowing pregnant mares to go out all winter does not necessarily mean that a sufficient supply of vitamin A is being obtained, especially in a hard winter, when grazings are little more than dried-up herbage, and in any case winter grass when not growing contains little or no vitamin.

My colleague, Professor Linton, is engaged on an investigation of the vitamin A reserve in the liver of horses and a preliminary report was given by me on his behalf at Belfast in July. He stated that of 78 horses examined up to that time 37 per cent. contained less than 100 B.U. per gramme—in some cases merely a trace; 13 per cent. less than 200; 28 per cent. less than 500, while only 6 per cent. contained 1,000 or more. He suggested that an herbivorous animal under natural conditions should carry a reserve

of vitamin A in the liver equivalent to 1,000 B.U. per gramme (Moore's units).

Further work on the vitamin A reserves is being carried out and will be extended to an examination of the livers of foals which die prematurely, if material can be collected, and also to the colostrum of mare's milk. When this work is further advanced it is intended to carry out feeding experiments on equines, and such experiments will need to be planned so as to cover the ante-natal and early post-natal period of life. Whether "rheumatic disease" in the horse is founded upon a vitamin A deficiency or not can only be proved finally by the experimental method of research.

Vitamin C (Anti-scorbutic Vitamin)

A diet of oats and hay is one which is completely lacking in vitamin C, but as the signs of "rheumatic disease" in the horse show so little resemblance to the naturally-occurring condition of scurvy in man or experimental scurvy in laboratory animals, this vitamin does not appear to be of importance. Calves and pigs have been shown to thrive without any obvious source of vitamin C, but no evidence is available that the same holds good for the horse, so that when the relationship of diet to disease in the horse comes to be experimentally investigated this deficiency is one which must not be overlooked.

I have limited myself to the consideration of some of the possible nutritional causes of the disease as these appear to be the most likely to lead towards a solution of the problem. It may be that I am working on quite wrong lines in the search for the cause of the disease and that some other environmental cause, such as infection, may still be proved to be the important factor. I hope, however, I have been able to create some doubt in the minds of the orthodox who have implicit faith in the hereditary nature of many of the disease conditions which are regarded as unsoundness in the horse.

Summary

1. The difficulty of finding a comprehensive title for the chronic generalised disease of the horse in which the various pathological conditions appear to have a common etiology has led to the employment of the term "rheumatic disease."

2. An attempt has been made to link up the various clinical and *post-mortem* changes, covering every stage of life from conception.

3. The hereditary nature of the disease is regarded as a hypothesis without scientific proof.

4. The part nutritional factors may play in causing the disease has been examined.

5. The probability of the disease being akin to osteofibrosa (osteomalacia) requires further consideration, in view of the experimental proof in the Philippines and the U.S.A. that a ratio of $CaO : P_2O_5$ of over 1 : 2 will produce disease.

In a series of 40 rations each consisting of hay 14 lb. and oats 12 lb. where the hay, mostly of Scottish origin, was the only variable food factor, it has been estimated that in 16 of these rations the $CaO : P_2O_5$ ratio was above 1 : 2, the average being 1 : 2·27.

6. The common diet of the horse, oats and hay, appears to be deficient in vitamins A, D and C.

The most likely vitamin deficiency to cause disease is vitamin A, there being a close resemblance between the neurological lesions met with in "rheumatic disease" in the horse and those produced in small experimental animals on diets deficient in this vitamin.

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VITAMINS A AND D IN COMMON FOODS

Cabbage when boiled does not lose any of its vitamin A-content; Jersey milk contains nearly twice as much vitamin A as ordinary London milk; calf liver contains no vitamin D. "These," says *The Pharmaceutical Journal*, "are some of the results obtained by Dr. Katherine Coward and Miss Barbara G. E. Morgan, who, working in the Pharmaceutical Society's pharmacological and nutrition laboratories, have made a comparison of the vitamin A and D potencies of numerous foodstuffs. The importance of the work will be obvious. It adds to our knowledge information which can be used to formulate a diet, based on ordinary food, for children or adults in which adequate amounts of the two vitamins are contained.

"In the investigation, which is reported in the *British Medical Journal*, November 30th, page 1041, simultaneous tests were made of a standard sample of cod-liver oil (1,500 international units per gm.) to provide a standard of reference at the time of each estimation. The following data are taken from the table showing the vitamin A potency per gm., in terms of the international standard, of the foods examined: Cabbage, fresh, 8·8, boiled (using weight equivalent of fresh), 9·6; carrot, fresh, 17·7 and 19·8, boiled, 19·1 and 18·8; runner beans, fresh, 5·0, boiled, 6·9; milk (November), ordinary London supply, average 3·0, Jersey average, 5·4; bone marrow, 8·1; dairy butter (July) 33·6, (August), 45·0; English cheddar cheese, 55·0; egg yolk, 30·0. It was apparent that the boiling of the vegetables in a normal household manner did not destroy any vitamin A."

PROPHYLAXIS IN LAMB DYSENTERY

W. LYLE STEWART, M.R.C.V.S.

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In 1926 Dalling[1] reported the successful transmission of typical dysentery to young healthy lambs on a clean farm, using amongst other methods, the intravenous injection of a virulent culture of *Cl. welchii* group micro-organisms isolated from a naturally affected lamb. At that time Dalling and his co-workers[2] also dealt with prophylaxis, first of all using the method of ewe vaccination. Untreated sheep served as controls for experimental groups of ewes on each farm, and at the end of the lambing season the mortality from dysentery in the lambs from both groups was compared. Thus, of 5,760 lambs born from 4,722 ewes vaccinated in the autumn and in spring, 3·06 per cent. died from dysentery, while of 2,509 lambs born of 2,248 unvaccinated control ewes 16·06 per cent. died from lamb dysentery. In addition, some passive immunisation experiments were carried out on newly-born lambs using an anti-serum prepared from the above micro-organisms, and these produced an even more striking result. The lamb dysentery mortality was reduced to 1·9 per cent. in a group of inoculated lambs, as compared with 22·6 per cent. amongst 425 untreated control lambs. Subsequent experiments undertaken by veterinarians in various parts of Britain have produced confirmation of the above findings, and specific prophylaxis —utilising either the vaccine or the antiserum —has become an established procedure of proved value in many sheep-breeding areas where dysentery is prevalent.

It was therefore surprising that during the 1933 lambing season some complaints were received that lamb dysentery antiserum was proving less effective than usual, and on one farm enquiry elicited the information that of 500 lambs inoculated at birth, 100 had died from dysentery. Few autopsies had been made, however, and the owner had not sought professional advice, but the history suggested the existence on this farm of a virulent type of dysentery against which the antiserum had had apparently little or no effect. Since lambing was over nothing could be done save keeping the flock under observation, and arrangements were made to conduct a controlled experiment on this flock the following autumn. Two-thirds of the ewes were then vaccinated with lamb dysentery prophylactic, and a second injection was given ten days before the 1934 lambing season was due to commence. One-third of the flock received no treatment. Notwithstanding this treatment dysentery broke out in the lambs during the second week of lambing, by the end of which 30 lambs, involving the experimental and control groups in equal proportions, had died from apparent dysentery. The disease was rapid in onset and course, and deaths occurred in lambs from three to 14 days old. Lamb dysentery antiserum was then supplied for injection into lambs born subsequently. Deaths from the disease continued, however, and the farmer was instructed to treble the usual dose of antiserum, so that from the fifteenth day of lambing each newly-born lamb received 15 c.cs. of antiserum, injected as soon after birth as possible. This dose likewise failed to stop the death rate, which by the end of the lambing season had amounted to about 80 lambs. Many autopsies were made on lambs from this farm and hyperacute lamb dysentery was diagnosed. A number of similar reports was received concerning the 1934 antiserum, and later Montgomerie and Rowlands[3] recorded the occasional failure of lamb dysentery antiserum in North Wales. Many of these reports received were by no means first-hand, and only a few could be investigated, but sufficient evidence was forthcoming to suggest that specific prophylaxis against lamb dysentery, apparently successful in many areas of Britain, had failed to give material protection on certain farms.

The hypothesis was that neither vaccine nor antiserum would protect on these farms.

These results were frequently discussed with Mr. T. Dalling, with whom the writer was in close consultation from this stage, and since the suggestion was that the routine method of using vaccine and serum had failed, other and more intensive methods of using them were devised. Mr. Dalling also suggested making homologous antiserum. This he prepared in sheep at Beckenham.

EXPERIMENTAL

It was then decided to conduct further field trials during the 1935 lambing season and to retest the value of specific prophylaxis. The object of this was not so much to compare vaccination of the ewes with serum inoculation of lambs, as to ascertain whether or not, by using a combination of these methods, specific protection against dysentery could be demonstrated on farms known to be affected. In a few cases, however (Group I), lambs from vaccinated ewes received no serum. Seventeen farms were chosen in various districts of the North of England, where the 1934 death-rate from dysentery was reported to have been at least 10 per cent. of the total lambs born. On some of these farms "unsatisfactory results" were reported from the use of antiserum in

1934. Details of the experiment are as follows:—

Group I.—Farms: (*Farms* 1, 2, 3 *and* 4)

(*a*) One-third of the ewes to be vaccinated three times, *viz.*, December, one month before and again ten days before the commencement of lambing. Lambs to receive no treatment.

(*b*) One-third of the ewes to be vaccinated twice, *viz.*, December and one month before the commencement of lambing. Lambs to receive L.D. heterologous antiserum at birth.

(*c*) One-third of the ewes and their lambs to receive no treatment.

Group II.—Farms: (*Farms* 5, 6, 7, 8 *and* 9)

(*a*) One-third of the ewes to be vaccinated twice, *viz.*, December and month prior to lambing. Lambs to receive L.D. heterologous antiserum at birth, and again when ten days old.

(*b*) Same as in (*b*) Group I.

(*c*) Same as in (*c*) Group I.

Group III.—Farms: (*Farms* 10, 11, 12 *and* 13)

(*a*) One-third of the ewes to be vaccinated twice, *viz.*, December and month before lambing. Lambs to receive L.D. homologous antiserum at birth.

(*b*) Same as in (*b*) Group I.

(*c*) Same as in (*c*) Group I.

Group IV.—Farms: (*Farms* 14, 15, 16 *and* 17)

(*a*) One-third of the ewes to be vaccinated twice, *viz.*, December and month prior to lambing. Lambs to receive L.D. homologous antiserum at birth and again when ten days old.

(*b*) Same as in (*b*) Group I.

(*c*) Same as in (*c*) Group I.

Vaccinated and control ewes were wintered together and the sheep were marked with distinctive permanent double markings. Wherever possible it was arranged that lambing should take place under identical conditions, and in the same fields as in 1934. Supervision of the experiment on every farm was undertaken by veterinarians, who examined all dead lambs. Detailed examinations of some of the lambs which died were also carried out at the laboratory.

The vaccine and heterologous antiserum used was that prepared at the Wellcome Physiological Research Laboratories by the usual methods, *i.e.*, the vaccine consisted of a formalinised whole culture of organisms of the "*Cl. welchii* group," and the antiserum was prepared by hyperimmunising horses with the toxins produced for the same types of organisms.

Results.

The results of this experiment are expressed in the following Table:—

Table I.

Number of Ewes Vaccinated and Unvaccinated. Deaths from Ascertained Dysentery.

Farms.	Ewes Vaccinated. No.	Lambs Born. No.	Lambs Dead L.D. No.	Per cent.	Ewes Unvaccinated. No.	Lambs Born. No.	Lambs Dead L.D. No.	Per cent.
Group I.								
1	146	231	2	0·86	73	103	4	3·88
2	240	335	4	1·19	120	165	16	9·70
3	312	424	1	0·23	160	294	3	1·02
4	405	316	1	0·31	189	191	1	0·52
Group II.								
5	314	547	1	0·18	157	246	11	4·47
6	86	159	2	0·12	43	78	11	12·95
7	512	735	1	0·14	256	336	26	7·73
8	300	363	1	0·29	150	145	4	2·76
9	200	184	0	0	100	89	15	16·85
Group III.								
10	36	64	0	0	17	28	1	3·57
11	153	193	0	0	69	72	23	31·94
12	62	106	0	0	31	50	0	0
13	104	159	0	0	62	62	22	35·48
Group IV.								
14	166	246	1	0·4	83	127	0	0
15	120	221	1	0·45	63	104	5	4·80
16	200	318	1	0·3	98	136	12	8·82
17	171	291	2	0·7	81	141	15	10·63
	3,527	4,892	18	0·36	1,752	2,367	169	7·14

Percentage Death-rate Lamb Dysentery

Experimental lambs, 0·36 per cent.
Control lambs, 7·14 per cent.

Striking as this difference is, it would probably have been much greater if all the "control" lambs in the groups to be left untreated, had actually remained without treatment. But in justice to the farmers who co-operated, it was impossible to be too scientifically detached, and as soon as any farmer began to lose lambs from true lamb dysentery on a substantial scale, antiserum was immediately supplied to the remaining lambs born in the control group.

DISCUSSION

The possibility must always be kept in mind that in lack of veterinary supervision, biological products of all kinds are liable to be misused in the field. Thus, cases are known where vaccine has been injected into newly-born lambs instead of antiserum, and others where farmers have used only one-half of the recommended dose. At the same time, instances are known where these factors presumably did not operate, and field experiences in 1933 and 1934 indicated that serum failures, in certain cases at least, were due to inability on the part of the antiserum to neutralise the toxic agent in inoculated lambs. The reason for these reputed failures is still under investigation, and in an endeavour to make careful field observations a controlled experiment was conducted on 17 infected farms during the 1935 lambing season. In addition, the intestinal contents of many lambs from these various farms were examined. The result of this field experiment shows that of 4,892 lambs born of 3,527 treated ewes 18, or 0·36 per cent., died from ascertained lamb dysentery, while of 2,367 lambs born of 1,752 untreated control ewes, 169 or 7·14 per cent. died from dysentery. In all cases dysentery was checked in the "control" lambs after commencing to use antiserum, and in no instance was the disease observed in an inoculated lamb. The experiment therefore may be said to have confirmed the value of specific prophylaxis against lamb dysentery. The specificity of lamb dysentery antiserum was further demonstrated by the examination of intestinal contents from affected cases. This material proved toxic in small doses administered intravenously in mice, and the toxic portions were regularly neutralised by the antiserum used in the field experiment.

Mr. Dalling and the writer have been impressed by the value of veterinary supervision in the administration of biological products to sheep. This is necessary for diagnosis and prophylaxis, while it also ensures that complaints will be investigated on the spot and without delay. Thanks are due to Mr. J. R. Rider, M.R.C.V.S., Darlington, Mr. Hugh Bain, M.R.C.V.S., Wooler, and Mr. I. A. Graham, M.R.C.V.S., Berwick-on-Tweed, who supervised the experiment in their own areas.

The writer has been in close consultation throughout with Mr. T. Dalling, and records him grateful thanks for his continued interest and for supplying all the materials used in the above experiment.

Summary

1. On certain farms during the 1933 and 1934 lambing seasons, it was stated that the routine methods of using vaccine and serum had failed to give the high protection expected.

2. This led to the suggestion that the vaccine and serum were not giving specific protection.

3. To test this point, an experiment was carried out on 17 farms. Amongst 4,892 lambs born on farms where the ewes had been vaccinated and the lambs received heterologous or homologous L.D. antiserum (except Group I farms (*a*)), the mortality was 0·36 per cent. On the same farms 2,367 lambs were born in the "no-treatment" group, and the mortality was 7·14 per cent.

4. There was thus no evidence of the failure of specific protection.

5. It is of interest that the whole of the inoculations in the 1935 season were carried out by veterinary surgeons, whereas the inoculations in the two previous years, during which reputed "failures" occurred, had been done mostly or entirely by farmers.

References

[1]Dalling, T. (1926.) *J. Comp. Path. and Therap.* **39.** p. 148.

[2]Dalling, T., Mason, J. H., and Paul, H. M. (1926.) *J. Comp. Path. and Therap.* **39.** p. 153.

[3]Montgomerie, R. F., and Rowlands, W. T. (1934.) *Vet. J.* **90.** 8.

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[*NOTE BY T. DALLING*, M.R.C.V.S., Langley Court, Beckenham, Kent: Mr. Lyle Stewart's field and laboratory experiments are highly interesting. We were much struck by the fact that in 1933-34 when the injections were done mostly by the farmers themselves, "failures" were reported, but in the 1934-35 season, when all the inoculations were done by veterinary surgeons, there were no "failures." Mr. Stewart and I regretted at the termination of the experiment that we had not included some groups which received vaccine or serum in the routine manner. A very large number of doses of both these materials was issued and used in the 1934-35 season, and we have no reason to doubt that they gave the expected high protection in other areas in England.]

"Mousey," believed to be the world's oldest horse, died at Southwold, Suffolk, at the age of 50 years and one month. She belonged to Mr. W. Meadows.—*Farmers' Weekly.*

DIFFERENTIAL ENUMERATION OF THE SPECIES OF NEMATODES ASSOCIATED WITH PARASITIC GASTRITIS IN SHEEP AND CATTLE

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A note which appeared in *The Veterinary Record* of May 5th, 1934, gave an account of a method of estimating the number of worms in the fourth stomach and small intestine of sheep and cattle for the definite diagnosis of parasitic gastritis. The present communication is a sequel to the previous one and is intended to be of assistance where it may be desired to take the investigation a little further, and, after ascertaining the total number of worms in the fourth stomach and small intestine, to estimate the number of each species present.

There is no intention of advocating such an analysis of an infestation where ordinary diagnosis concerned, it being sufficient then for all practical purposes to know something of the total number of worms present, and whether the infestation is mainly one of *Hæmonchus* or is also concerned with other species. Where research is being carried out, however, or where there is any intention of making a report on a particular outbreak, it might add greatly to the value of the record to give as exact an account of the nature of the infestation as can reasonably be done. The task is not so formidable as might appear, the whole differentiation, after the count has been made, requiring only some 20 or 30 minutes.

Method of Making the Differential Count

The first procedure is to make a count of the total number of worms in the fourth stomach and small intestine, as described in the previous paper, then to differentiate some 25 to 50 worms in a representative sample taken from the whole, and finally to calculate the numbers of the various species by dividing the total in the proportion of the numbers of each species in the representative sample.

The best way of carrying out the differentiation is as follows:—

After completing the total count the worms are allowed to sink to the bottom of the dish containing the 4,000 c.c. of water, about 3,000 c.c. of water is then decanted, all the worms being left behind in 1,000 c.c. or rather less than 1,000 c.c. A small sample is then taken from this by means of the trumpet-ended pipette described in the previous paper, stirring vigorously while it is being done to ensure an even distribution of the species.

The sample is placed on 3 in. × 1 in. glass microscope slides in amounts of about 0·2 c.c. containing the worms, or as much as can conveniently be managed, and covered with $\frac{7}{8}$ in. × $1\frac{1}{2}$ in. coverslips. Superfluous water is then withdrawn from under the coverslip by means of a very fine glass pipette or with blotting paper, so that the worms can conveniently be examined under the microscope. The slides are then worked over systematically from end to end, using the lowest power available to find each worm and then examining the characteristic parts under a higher power, so determining the species of each specimen as it is encountered, until a total of 50 worms have been examined and identified. It is, of course, important to identify each worm as it is found under the microscope, and not to pass along until one that is more easily recognised appears in the field of vision, as the proportions of the various species might then be influenced by the relative facility with which they can be examined and identified.

This differentiation may be done by the aid of the accompanying key (p. 1513), which attempts to reduce the statement of the principal differences to the simplest possible terms. The $\frac{1}{6}$ in. objective must be used for the examination of the detail of some of the parts that are figured, and after a little practice it will be found comparatively easy to recognise the different species by the characters shown in the drawings (overleaf).

The spicules of the male are the most characteristic feature, and in freshly collected worms their morphology can usually be seen quite clearly, without any special preparation. In preserved specimens, however, this is not so easy, as the cuticle is less transparent and such worms are best mounted in a solution of phenol made by dissolving phenol crystals in as little alcohol as possible; or better still in lactophenol, made up as follows:—

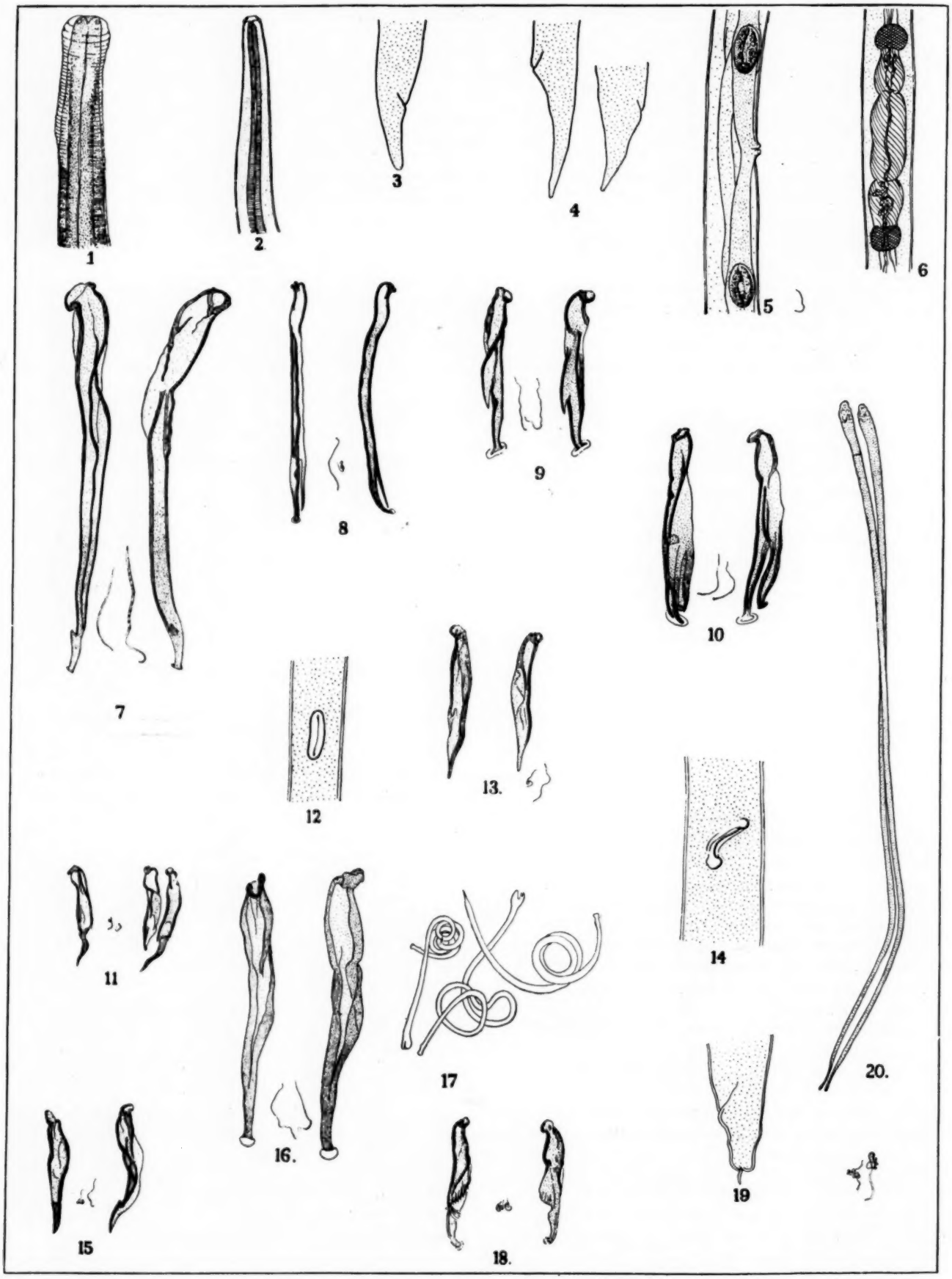
Phenol crystals	...	1 part.
Lactic acid ...	...	1 part.
Glycerine ...	...	2 parts.
Distilled water	...	1 part.

The female worms are not so easily differentiated as are the males and reliance cannot be placed on one and the same feature throughout the whole of the series, such as has been done with the males. Excepting the three species of *Ostertagia*, it is possible, however, to be tolerably certain of their specific identity.

It may help to clarify the use of the last column in the key to mention the differential characters of each species *seriatim*:—

The female *Hæmonchus* may easily be picked out by its large size and by the spirally twisted disposition of the ovaries.

Females of the various species of *Ostertagia* cannot easily be separated from one another, and in making the differential count it is best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Key to the Differentiation of the Worms Associated with Parasitic Gastritis in Sheep and Cattle

(*a*) All have a pointed head except the species of *Cooperia*. (Fig. 1, Bulging head of *Cooperia* species ; Fig. 2, Pointed head of other species.)

(*b*) Females of all the species have a pointed tail except *Strongyloides papillosus*. (Fig. 3, Rounded tail of *Strongyloides* species ; Fig. 4, Pointed tail of other species.)

(*c*) Females of all the species have ovijectors except *Strongyloides papillosus*. (Fig. 5, Absence of ovijectors in *Strongyloides* species ; Fig. 6, Presence of ovijectors in other species.

Species Normally Inhabiting the Fourth Stomach.

Name of Species.	*Male character.* The large figures on the opposite page represent the spicules (two different aspects), enlarged 93 times, and the small figures the actual size of the worms.*	*Female Characters.*
Haemonchus contortus ...	Fig. 7	Large size. Ovaries spirally twisted round intestine—" Barber's pole " appearance.
Ostertagia circumcincta ...	Fig. 8	Vulva a transverse slit. The females of these three species are very much alike and are best lumped together and subsequently divided in the proportion of the corresponding males.
Ostertagia trifurcata ...	Fig. 9	
Ostertagia ostertagi ...	Fig. 10	
Trichostrongylus extenuatus	Fig. 11 Spicules of unequal length.	Vulva a longitudinal slit. (Fig. 12.)

Species Normally Inhabiting the Small Intestine.

Trichostrongylus vitrinus ...	Fig. 13	Vulva crescentic, diagonally placed. (Fig. 14.)	
Trichostrongylus colubriformis	Fig. 15	Vulva a longitudinal slit. (Fig. 12.)	
Cooperia oncophora ...	Fig. 16	Large size not coiled	Bulging head. (Fig. 1.)
Cooperia curticei	Fig. 18	Smaller size. Coiled. (Fig. 17)	
Nematodirus filicollis ...	Fig. 20	Large size. Tail with spike at tip. (Fig. 19). Contains large eggs.	
Strongyloides papillosus ...	No parasitic male	Absence of ovijectors. (Fig. 5.) Rounded tail. (Fig. 3.) Contains small eggs.	

Note.—Mention is only made of distinguishing characters, *e.g.*, pointed tail and presence of ovijectors is not mentioned for *Haemonchus*, *Ostertagia*, etc.

*Owing to the difficulty of printing a fine enough line the smaller worms are represented as much thicker than they actually are.

to lump them all together and to divide the total number in the proportion in which the various males have been found.

T. extenuatus (more properly called *T. axei*) is the only species of the genus *Trichostrongylus* which is likely to be encountered in the fourth stomach. It may be differentiated from the other worms in that situation (*H. contortus* and *Ostertagia* spp.) by its smaller size, and by the shape of the vulva, which presents a longitudinal slit instead of a transverse slit as in *Ostertagia*. Other species of *Trichostrongylus* are the only worms that could possibly be confused with it.

In the small intestine the two species of *Trichostrongylus* which normally inhabit that part, *T. vitrinus* and *T. colubriformis*, may easily be differentiated by the characteristic shapes of the vulvas, as shown in the key.

The genus *Cooperia* may readily be recognised even under a low power magnification by the larger head, and the two common species can be distinguished from one another by the relatively large size of *C. oncophora*, and by the coiled position in which *C. curticei* is almost invariably found.

Nematodirus filicollis is a relatively large worm and may be singled out by the characteristic tail, which bears a spike at the end, and by the eggs, which are almost twice as large as those of any other genus of the trichostrongyloid worms of sheep and cattle.

Strongyloides papillosus (there is no parasitic male in this species) is very small but may easily be distinguished from the other small species found in the small intestine by the rounded extremity of its tail, and by the absence of ovijectors. This last difference is the most

easily recognised and can usually be seen quite clearly under the low power magnification.

In some few individual worms it may be found difficult to see the vulva because it happens to be laterally disposed as the worm is seen under the microscope. This difficulty is best overcome by pushing the coverslip a little to one side or the other with a dissecting needle and so causing the worm to roll.

Although the various species are found to confine themselves fairly closely to their respective situations in the stomach or the small intestine a few are occasionally found, out of place. Worms normally present in the stomach are more frequently found in the intestine than the reverse, presumably because they are moved along with the ingesta when the stomach becomes unsuited to them; this may happen either as a result of the host developing a resistance, or through some abnormality in the functioning of the stomach, as presumably may occur in the last stages of parasitic gastritis, when worms have been noticed to leave the host.

In practice it is often found to be more convenient to make a note of the numbers of *Hæmonchus* when the preliminary count is being carried out; these worms can be distinguished with adequate certainty by the naked eye and to count their number in that way gives a more accurate result for that species than would a calculation from the proportion of *Hæmonchus* in only 50 worms. In making the differentiation under the microscope *Hæmonchus* is then overlooked and the species of the first 50 worms other than *Hæmonchus* is determined. Having arrived at an estimation of the total number of worms in the stomach or in the small intestine and having differentiated a sample of 50, and so obtained an indication of the relative numbers of the various species, it is an easy matter to make a calculation and to ascertain the actual numbers of the various species which are present.

The chances of wide error occurring in such a "hit and miss" method of estimation as this is, must at once be obvious to all who are mathematically minded; everyone will agree, however, that it is better than pure guesswork and in actual use it has been found to give a valuable indication of the nature of an infestation.

An attempt is being made by her brother to upset the will of a woman who died last month, leaving upwards of 300,000 lire (about £5,000 at Italian internal rates) for the benefit of cats. She bequeathed 15,000 lire to a Roman veterinary surgeon on condition that he fed and looked after her 13 cats until their death. Another 10,000 lire were bequeathed to a second veterinary surgeon to look after and feed stray cats. The residue of the estate, apart from 20,000 lire left to a charitable institution, was left in the interests of cats to the Roman Society for the Protection of Animals.—*The Times*.

Obituary

Dr. GRIFFITH EVANS

A Great Pioneer Veterinary Scientist

It is with the deepest regret that we record the death at the age of 100 years of Dr. Griffith Evans, D.Sc. (Wales), M.D., C.M. (McGill), M.R.C.V.S., of Brynkynallt, Bangor, North Wales, Inspecting Veterinary Surgeon, Army Veterinary Dept. (retd.), who passed away at Bangor on Saturday, December 7th, 1935.

The King and Queen, the Prince of Wales, and many eminent men both in England and in America joined in a tribute to Dr. Griffith Evans on his 100th birthday on August 7th last, when Professor Sir Frederick Hobday, Principal and Dean of the Royal Veterinary College, handed him a scroll on behalf of the College, where he qualified in 1855. It was our pleasure and privilege, in connection with that great occasion, to print a biographical appreciation of Dr. Griffith Evans, wherein the life and work of the great veterinary scientist were detailed, while in subsequent issues have been reproduced a representative selection of the tributes paid him by leading scientific men and institutions in this and many other countries, and we now recapitulate the main features of Dr. Griffith Evans' life and career.

Griffith Evans was born at Ty Mawr, Towyn, on August 7th, 1835, and on his mother's side was descended from Ednywain ap Bradwen, a member of one of the 15 tribes of Gwynedd, and one of the five Royal tribes of Wales. His preliminary education was obtained at a local school and after a short pupilage with a local doctor, John Pugh, F.R.C.S., young Evans set himself to qualify as a veterinary surgeon with a view to obtaining an appointment in the army. He travelled to London—part of the way by the stage coach—and attended the Royal Veterinary College from which he qualified on May 24th, 1855.

January, 1860, saw him commissioned in the Royal Artillery and June, 1861, stationed at Montreal. Here he seized the opportunity and registered as a medical student at McGill University from which he graduated M.D., C.M., in 1864. In his thesis "Tuberculosis" he put forward evidence of the infectious nature of this disease and advocated the open-air system of treatment. He continued to work throughout the following year as a post-graduate student at McGill, extending his knowledge and experience and building up a technique which, within a few years, served him so well.

When the American Civil War broke out Evans was attached to the Royal Artillery at Montreal. He was anxious to visit the field hospitals of the Northern Army, and in spite

of many obstacles put in his way he obtained an interview with President Lincoln at the White House. A "roving commission" was granted him, and Lincoln gave instructions that the military authorities in the field were to give him every assistance he wished, on condition that he helped the wounded and made himself medically useful to the troops. While he was with the Northern Army he became on intimate terms with General Grant, General Meade and General Thomas. After a severe illness he was moved to a new station at Toronto.

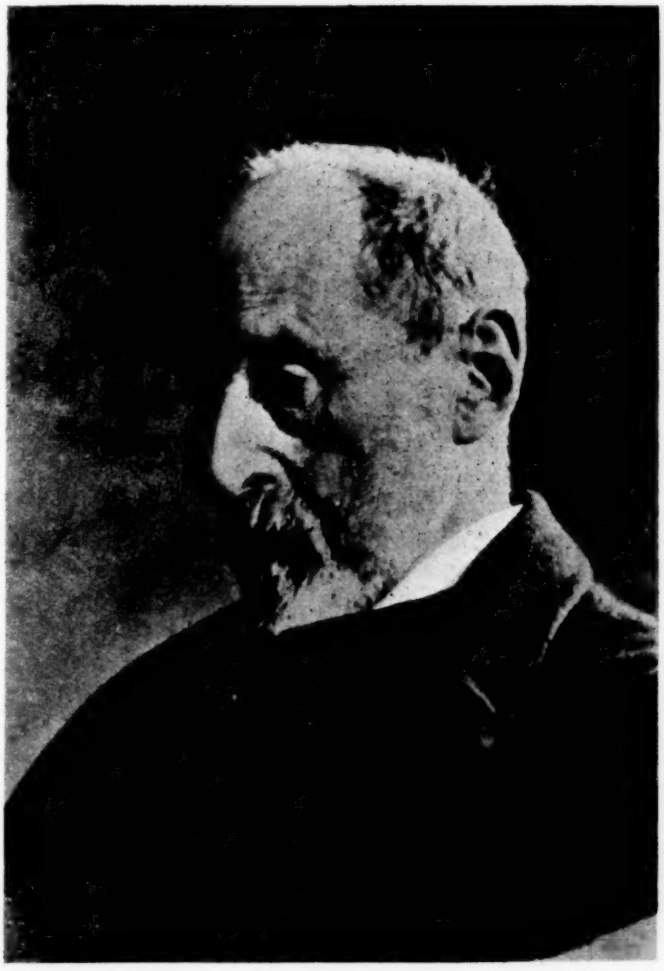

Photo.: A. & G. Taylor, Cardiff.

Evans returned with the troops to England in 1870 and was stationed at Ipswich where, enjoying the friendship of the medical staff of the Infirmary, he continued his studies. Late in 1870 Evans married and, although the temptation to settle down was great, he decided to continue in the Army. In 1871 he transferred from the Royal Artillery to the Army Service Corps and was stationed at Woolwich for several years. These were years of study — a post graduate course at King's College, London and at the Royal Ophthalmic Hospital, Moorfields, and the run of the clinics at the London Hospital under the friendship of Jonathan Hutchinson, senior. In 1877, he was ordered to India, where, on arrival, he was sent to the Punjab to investigate a disease which for many years had been very fatal to army horses there and at other stations. His investigation of this condition was most thorough and soon led him to suspect that a "parasite of the blood" was the causal agent. He watched for the appearance of the first symptoms and then made a microscopical examination of the blood at hourly intervals. He noted an early increase in the white corpuscles, the appearance of bacilli rather closely associated with these corpuscles, the increase in the number of bacilli, their becoming free from the corpuscles and, in the last stages, their presence in overwhelming numbers. That disease he proved to be anthrax. This work on anthrax having gained him local recognition as a sound worker, he was officially asked in August, 1880, to go to Dera Ismael Khan to investigate the disease which for many years had proved fatal to horses and camels of the Punjab Frontier Force and which was known as "Surra." Before he proceeded he obtained all available reports upon this condition and studied them with scrupulous care. It seemed to him that, although none of the previous observers had suggested it, some parasite in the blood was at work. He appreciated that surra was only recognised to exist after the disease was well established and that he must have every facility for his investigation. He sought permission to attempt to transmit the disease to healthy animals so that he might study it in its first stages, and at Dera Ismael Khan, Evans demonstrated to the Surgeon of the Cavalry Regiment "microbes, swarming in the first drop of surra blood examined." Within a few days he had transmitted surra by subcutaneous injection and by feeding the blood of an affected horse. By repeating his experiment he proved to his own satisfaction that surra could be transferred from horse to horse and that the organism we now know as *Trypanosoma evansi* appeared quite regularly in the blood of his experimental horses about the sixth day after inoculation. He demonstrated the organism in the blood of affected camels. Furthermore, although it was not then known that surra could affect dogs, he succeeded in transmitting it from the horse to a dog and to a bitch. Officially, however, Evans was regarded as a crank. He was, forth-

with, appointed, for a period of five years, Inspecting Veterinary Surgeon of the Madras Presidency. Fortunately for science, Evans supplied both Koch and Pasteur with a copy of his report and it was largely through their study of his work that, years later, Evans was hailed as the discoverer of the first pathogenic trypanosome. By this discovery the foundation of protozoon pathology was laid, for in the next decade it was found by Sir David Bruce that the tsetse-fly disease was caused by *Trypanosoma brucei*, which was discovered in Zululand. It was further discovered in 1903 by Bruce and Nabarro that the tsetse-fly was also the carrier of sleeping sickness. Without his pioneer work these discoveries would in all probability have been very long delayed.

The discovery, too, of a filaria in camel blood, both adult and embryo, named in 1882 *Filaria Sanguinea evansi*, was made by Evans.

Evans returned to England and towards the close of the year 1885, entered on a period of five years of work which lay close to his heart. Stationed at Woolwich as Inspecting Veterinary Surgeon, he found time to work in Crookshank's laboratory at King's College studying bacteriology, mastering the rapidly advancing technique of the science he so loved.

In 1890 Evans retired from the Army with a Service Pension. He settled down in Bangor to enjoy a well-earned retirement, but the University College of North Wales induced him to deliver a course of lectures on Veterinary Hygiene in the Agricultural Department during session 1890-1. So successful did this course prove that he was reappointed annually for 20 years. Then, failing health brought about complete retirement at the age of 75.

Recognition of the immense value of his scientific researches came only when he was well advanced in years. The award of a Distinguished Service Pension came in April, 1913. In 1917 the Liverpool School of Tropical Medicine made a just reward in presenting to Dr. Evans the "Mary Kingsley Medal for distinguished Scientists who have assisted the cause of Tropical Medicine by original research." The Royal College of Veterinary Surgeons followed by presenting the John Henry Steel Memorial Medal in 1918. The University of Wales conferred the degree of D.Sc. (*Honoris Causa*) in 1919. The City of Bangor honoured Dr. Evans by conferring the freedom of the Borough on him in 1931. This honour related in part to his period of residence in the City where, independent as ever, Dr. Evans had become esteemed as a leader in religion and in philosophy.

In 1932, at a dinner in London of the Hunterian Society to commemorate the 204th anniversary of the birth of John Hunter, Dr. Evans was presented with the Hunterian Medal, the first struck in gold, for an original essay.

In 1870 Dr. Evans married Catherine Mary Jones, and had one son and four daughters, one of whom has recently expressed the opinion that, but for a reference made to it by Dr. du Toit (Johannesburg) in his Presidential Address to the Agricultural Section of the British Association Meeting in 1930, England would have remained ignorant of the pioneer work which her father carried out.

In the closing years of his life, Dr. Griffith Evans was bedridden, as the result of leg injuries sustained from a fall in the garden of his home, but he remained mentally alert and vividly interested in medical science to the end; indeed, as Sir Frederick Hobday wrote in our issue recording the "presentations day" scene at Dr. Griffith Evans' home on his 100th birthday: "It was difficult to find a veterinary subject with which Dr. Evans was not *au fait* and his grasp of modern every-day subjects would put many of our present-day graduates 'in the shade'; whilst the accurate recollections of 'men and things' of 60, and even 80, years ago were astounding."

The Veterinary Record

December 14th, 1935.

YEARS AND HONOUR

IT is but a few short weeks ago since this journal, in common with the nation headed by His Majesty, scientific institutions and the leading organs of the professional and lay press of the world, paid tribute to the life and work of the profession's centenarian, Dr. Griffith Evans, of Bangor. Last week-end saw the close of that wonderful career of labour and devotion in the pursuit of knowledge with achievements which have proved of such inestimable benefit to medical science and which have, in the belated but eventual recognition of their worth, greatly enhanced the prestige of all workers in the veterinary field, where his outstanding work was done, and brought much honour to the veterinary profession of which he was so distinguished a member. Though, therefore, mourning so soon follows congratulations and rejoicing—Griffith Evans attained his 100th birthday on August 7th last—it is solace indeed to know that the great veterinary scientist lived to receive the homage due to him as one whose phenomenal span of years was perhaps the least of his claims upon our esteem. The full text of the thrilling story of his even greater achievements, so full of past and

potential significance in the wide field of his researches, appears in the issue of *The Veterinary Record* of August 3rd, while in that of August 24th were recorded a few of the vast number of striking tributes which poured in a flood upon the father of the profession from every quarter of the globe. It is now but left to us, therefore, in profound sorrow at Griffith Evans' passing, to reproduce in outline, as we do elsewhere in this number, the life-story of one whose labours and triumphs in the realms of pathology, bacteriology and protozoölogy have had a fundamental bearing on the diagnosis and treatment of many diseases and which have been of inestimable benefit to human- and animal-kind.

So, "full of years and honour," passes Griffith Evans, whose presence embodied heroic endeavour in a degree already traditional amongst us and whose example is surely destined to be the inspiration of many generations of veterinarians, seeking heart and guidance from the records of our great pioneers.

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EQUINE SKELETAL "UNSOUNDNESS"

THE most common form of disease of horses in this country to-day is one or other of those forms of disability which we term "unsoundness." For this reason, apart from any other consideration, we must deplore the lack of progress shown in the elucidation of the many problems which confront us in connection with these conditions. When we call to mind the numerous advantages enjoyed by the modern clinician it may be pertinent to ask what might not have been the present state of our knowledge of these various defects, were the majority of veterinarians to-day still chiefly engaged with equine practice. Such progress as we can count to our credit has been mainly in the field of diagnosis. But little headway has been made with treatment and the etiological factor still eludes us.

The theories advanced in explanation of the cause of bone lameness and other forms of unsoundness have been many. The original contention that in domestication or some occupational activity lies the direct cause, provides a theory that is alike both simple and attractive and one which still claims its many adherents. No great wealth of clinical experience, however, is necessary to make any such hypothesis untenable in all but the most simple cases of injury. The theory of heredity has more to recommend it. Recently Way and Hoffman, working in America, have ascribed a bacterial origin to a majority of the forms of bone lameness in horses, a theory which does not appear to have attracted any measure of support in this country. It is clear that our knowledge of the subject is not advancing in a manner commensurate with developments in other fields of veterinary science.

It is thus with special pleasure that we publish to-day a further communication from Professor Mitchell on his study of the etiology of "osteo-arthritic and allied conditions in horses." This paper is mainly concerned with an examination of certain nutritional factors which might throw light on the true cause of these diseases, or as he believes, this disease. The encouraging results which have attended the study of mineral imbalance and avitaminosis of diets in a steadily increasing list of pathological conditions is in itself a more than sufficient justification for Professor Mitchell's work on similar lines. Many, however, will find in his observations an importance apart altogether from their direct relationship to the problem under consideration.

Professor Mitchell would have us discard in its entirety the theory of the hereditary nature of many of the forms of equine unsoundness. It is certain, however, that until convincing proof is forthcoming of the operation of a definite etiological agent, this theory will continue to secure a large measure of support and to exert an influence on horse-breeding legislation and schemes.

Professor Mitchell indicates that he has had difficulty in finding a single name to embrace the extensive list of pathological lesions which he ascribes as probably due to a single causal agent. We agree with him that the term he has chosen, namely, "Rheumatic Disease," leaves much to be desired and no doubt his expectation that it will be short lived, will be realised. Meanwhile the value of the work which he is doing is undeniable and the profession will await with interest its further developments.

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ANÆROBIC DISEASES OF SHEEP

SHEEP are highly susceptible to diseases caused by the various groups of anærobic micro-organisms and investigations pursued during recent years have shown that in this country the losses in certain districts directly attributable to such infections may be considerable. Though several of these anærobic

infections have been the subject of intensive research by various research workers it is felt that there is an urgent demand for immediate further study. To this end the Agricultural Research Council set up a committee composed almost entirely of veterinary surgeons with special knowledge of sheep disease research, under the Chairmanship of Professor Mackie (Edinburgh) with Dr. A. D. McEwen (Wye) as Secretary. The committee has been in existence for over two years and in order to facilitate the investigation into this group of diseases has launched a scheme in which the co-operation of the sheep farmers, veterinary practitioners, Veterinary Investigation Officers and Research Institutes is necessary. Hitherto, the various research workers who have studied sheep diseases have had to rely largeiy on arrangements made by themselves for the collection of the necessary specimens. It is hoped that the Agricultural Research Council scheme will result in the obtaining of considerable amounts of material for examination. Correspondence between the Agricultural Research Council and the N.V.M.A. has resulted in a clear understanding regarding the part to be played in the scheme by veterinary practitioners, Veterinary Investigation Officers, etc. The scheme has met with the approval of the N.V.M.A. and the Council at its meeting on October 1st, commended the scheme to the members of the Association. The part to be played by veterinary practitioners is all-important and is that of a liaison between the sheep farmers, the investigation officers and the Research Institutes. Veterinary practitioners are being consulted more and more each year in connection with the control of disease. It is true that in some cases they are in a position to give advice on preventive treatment, but there are still many outbreaks of disease of which our knowledge is very scanty and on which research must be carried out. The practitioner can influence farmers to send specimens for investigation to the Veterinary Investigation Officers and to keep on sending specimens as long as they are required. Should it be found that the disease is one for which preventive measures are already established, the veterinary practitioner and the farmer will be acquainted with the diagnosis made by the investigator or Institute and the control of the outbreak will be a matter for the veterinary practitioner and the farmer. On the other hand, it is anticipated that many of the specimens received will require somewhat lengthy investigation at the various laboratories with a view to establishing the types of anærobic infections prevalent in different parts of the country.

This scheme of investigation is one of the most comprehensive yet attempted with regard to disease. Its success can be assured if the various sections of the veterinary profession collaborate fully. The N.V.M.A. is anxious that its members should make their contribution in as large a measure as possible. Practitioners who are in the position to be of assistance can receive literature, receptacles for specimens, etc., from the Veterinary Investigation Officers in their district. May we again point out that it is from the veterinary profession that sheep farmers should obtain first-hand information regarding the ailments of their stock; the operation of this scheme will go far to maintain the proper relationship between the farmer and his veterinary surgeon. The season during which anærobic infections are most prevalent is fast approaching; it is earnestly hoped that the scheme will be in operation and prove valuable to all concerned before the season is far advanced.

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PARASITIC AFFECTIONS OF SHEEP AND CATTLE

In the present issue is published a short article, with figures, upon the "Differential Enumeration of the Species of Nematodes Associated with Parasitic Gastritis in Sheep and Cattle," by Mr. E. L. Taylor, of the Laboratory of the Ministry of Agriculture and Fisheries. It is only within comparatively recent years that the veterinary profession has taken a serious interest in the parasitic diseases of cattle and sheep. Indeed, there is to-day quite a number of non-veterinary workers writing on field matters. Our increase in knowledge is largely, if not almost entirely, due to laboratory research combined with field observations of research officers. The more research is prosecuted in these directions, the more apparent does the influence of parasitic affections upon sheep and cattle become. Taylor's work on the epidemiology of these diseases has been of considerable value to owners and harassed practitioners.

The present paper shows how the offending species can be distinguished and enumerated—points of importance where there are satisfactory methods of treatment for some species, and unfortunately at present none for others. The canine surgeon with his scratching pets, or the equine practitioner with his colic cases, is in Utopia when compared with the

position of the country veterinary surgeon, surrounded by flocks heavily infested with liver flukes and intestinal helminths, or by store cattle suffering from parasitic scour or hoose. Gradually, methods of diagnosis by *post-mortem* examination and enumeration of the species present, or microscopic examination of the fæces of the living by egg-counting methods, have been introduced. The twisted stomach worm and the liver fluke have been conquered therapeutically, and now control measures are slowly but surely taking shape. Many of these advances have been due to pressure from owners of animals or their associations owing to serious and widespread loss.

With our knowledge arrived at this stage and with fresh workers entering the field to carry it further, it only remains for the practitioner to keep abreast of the times and apply these advances. It is the duty of the veterinary press to keep its readers informed on these subjects and in the case of the National Veterinary Medical Association the Advisory Committee on Parasitic Diseases exists for such a purpose. The new regulations of the Royal College of Veterinary Surgeons have given full recognition to the subject of parasitology, and this circumstance, together with the appointment of specialists in veterinary parasitology at the Colleges, will tend to give the student an even more thorough grounding in the subject than in the past. These facts augur well for the success of possible eradication schemes which are likely to be pressed upon farmers, landowners and local authorities in the future, and which assuredly will prove of lasting benefit to stockowners.

FARMER'S LIABILITY FOR VETERINARY TREATMENT

The Solicitors' Journal reports the case *Meadowcroft* v. *Inchboard*, recently heard at Easingwold County Court, in which a claim was made for £2 2s., being the fee paid by the plaintiff to a veterinary surgeon on behalf of the defendant. The latter had bought a cow in calf at the plaintiff's premises, where the cow was left to await transport. The cow calved before being moved, and the plaintiff proposed employing a veterinary surgeon to cleanse the cow. The defendant contended, however, that the cow had aborted, and he refused to take delivery. His manager nevertheless called in the veterinary surgeon, who certified that there had been no abortion, and cleansed the cow—otherwise she might have died. The defendant disputed liability to pay the expense incurred by the plaintiff, who had no authority to do so. The defendant also contended that, if he had thought it necessary to employ a veterinary surgeon, he would have employed his own. His Honour Judge Stewart held that the veterinary surgeon was rightly called in as the cleansing of the cow was a necessity. Judgment was therefore given for the plaintiff, with costs.

Clinical Communications

PYÆMIC ARTHRITIS IN A FOAL

W. E. BLACKWELL, M.R.C.V.S.
TOWCESTER

Subject.—Shire filly foal, three months old. In very good condition and running with the mare.

History.—The owner had docked the foal himself on June 5th. A week later, a swelling appeared round one hock, and the foal was very slightly lame. Thinking she had "ricked" herself somewhat with galloping around, he took very little notice of this, but during the following week the other hock swelled up in like manner, and one fetlock also. At this stage the foal was rather dull, and had lost much of her spirits. My client now had a talk with his neighbour about it, and becoming apprehensive, decided to seek professional advice—I gathered that this neighbour had informed him that it was "The Evil"; from which disease he himself had lost a good foal recently.

Examination.—I first saw the case on June 26th. The symptoms, as outlined above, were well marked. I examined the navel, but there was nothing wrong there. I found a dry scab, the size of a three-penny bit, on the outside of each hock, where the hair had been rubbed off. Though rather mystified, I failed to find any other evidence for my opinion, on this first visit. I did not think the case was one of navel-ill, or joint-evil, as one usually encounters these diseases, and I gave my reasons for this view—firstly, the age of the foal; secondly, the absence of any history of navel trouble.

Diagnosis.—Pyæmic arthritis.

Prognosis.—Guarded.

Treatment.—Rest. Hot fomentations. Dry bandages afterwards.

Course of Disease.—Having thought over the case, and not being quite satisfied about the origin of the condition, I saw the foal again four days later. I asked all about the docking operation of which the owner had told me. He informed me that he did it with a chopper, and had done it many a time that way. Thinking this was very primitive and cruel, I examined the tail. There was a thick black scab over the wound, and this appeared quite dry. I lifted it off and underneath was thick pus. This was immediately removed, and left a concavity the size of a saltspoon. I dusted this with antiseptic powder, and instructed my client to do this three times daily, and continue the fomentations.

Outcome.—I asked for a report ten days later: "Going on nicely." On visiting the case a fortnight after the receipt of that report, I found that the hocks and all joints were perfectly normal. The new hair had covered the small

abrasions, and there was no evidence of any previous disease. The filly was playful and happy, and could use her hocks and limbs as well as ever.

Remarks.—If I had used any serum or other remedy by way of treatment, how easy it would have been to speak its praises—for some result for which it would not have been responsible.

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COLT'S DEATH FROM INTERNAL HÆMORRHAGE

W. E. BLACKWELL, M.R.C.V.S.
Towcester

Subject.—Bay nag gelding, three years old. In excellent condition; unbroken. June, 1935.

History.—This colt had been running out at hilly pasture with two others. He had not been handled much, and was very lively. Twelve months previous to this, he sustained a lacerated wound a foot long, on the right side of the chest, stretching in a backward and slightly upward direction from the point of the elbow. This wound healed without trouble of any kind, and there was very little to be seen now. On the day of his death he was seen by the owner, standing away from the others, a most unusual thing for him to do. This was about 9.30 in the evening. He was caught very easily, haltered, and led gently indoors. It took him an hour to walk three-quarters of a mile. I saw him at 10.30 p.m. Because of his quietness, the owner suspected something rather serious had happened.

Examination. The colt stood perfectly quiet in the loose box, whilst I proceeded to investigate his trouble. There was no pain, sweating, lameness, blowing, nasal discharge, cough, thick leg, swollen glands, or, in fact, anything discoverable, by which one could make some sort of rational diagnosis.

Symptoms.—Temperature 102·2°. Pulse weak but regular, about 50. Visible mucous membranes presented a dull red appearance. Mouth dry and hot. No fæces or urine had been passed since illness was discovered.

Diagnosis.—Intestinal stasis, subacute inflammation of the bowels—possibly due to plant poisoning. Before giving any treatment, I kept him under observation for a quarter of an hour, principally because I was puzzled, and not very satisfied with my own opinion. Once he moved very slowly across the box, and put his nose to the ground. That rather strengthened my view. I thereupon gave him two balls of ammon. carb. and nux vomica, and remained with him. Soon after this he became much more uneasy, and started to sweat, and move very anxiously about, though very slowly and deliberately.

Course.—The rapidity with which he grew worse rather surprised me. I felt his pulse very carefully several times during the next 15 minutes or so, and on the last occasion there was an alarming change. I immediately informed my client that something very serious was happening, and that a fatal and quick termination of the case must be expected. I took the lantern and exposed the inside of the mouth and lips, finding them absolutely bloodless. I told the owner to keep clear, as the colt must drop dead in a few minutes at this rate. No sooner had I spoken these words, than the colt swayed: I then hurried clear myself, as the colt collapsed and died.

Post-mortem.—I attended this at 10 a.m. the next morning. The colt was kept on his back and opened in that position. The abdominal cavity presented a remarkable appearance. Its pallor was uniform—not a trace of colour anywhere. The bleeding had evidently taken place in the thorax. The diaphragm was slit carefully along what was now its roof, first on the right side, and then on the left. The right thorax was empty, but the left side was almost full of arterial blood and blood clots. Very carefully this was allowed to run out, and the source of the trouble was located. The heart was not ruptured as I thought. The left ventricle was empty; the right was full of clotted blood. There was a clot of blood the size of a cricket ball, at the top of the right auricle at the point of entry of the anterior vena cava. The case was therefore diagnosed as one of rupture of the anterior vena cava.

Remarks.—The remarkable feature of this case, to my mind, is the fact that this fine young horse had never worked, or undergone any severe exertion. Could it be possible that the lacerated wound on the chest wall, sustained twelve months previously, had any connection with the fatal rupture, so long after? The only explanation I could offer was that the colt had been galloping, had suddenly slipped, and had fallen very heavily on to his left side.

PARLIAMENTARY SCIENCE COMMITTEE

At the annual meeting of the Parliamentary Science Committee (upon which body the N.V.M.A. has representation), held at the House of Commons under the presidency of Lieut.-Colonel Sir Arnold Wilson, M.P., the following officers were elected:—

President, Lord Dudley; chairman, Lieut.-Colonel Sir Arnold Wilson; vice-chairman, Professor B. W. Holman; deputy-chairman, Mr. Alan E. L. Chorlton, M.P.; hon. secretary and treasurer, Mr. H. W. J. Stone. A representative executive committee was also elected.

The hon. secretary's annual report, which was received and adopted, stated that among the subjects to be considered by the committee in the near future are the endowment of research and the remission of death duties on bequests for research.

Owing to the impending demolition of the Adelphi the committee is moving to Granville House, Arundel Street, Strand, W.C.2, on January 1st.

Abstracts

[Preliminary Investigation of a Disease of Sheep possessing certain Characteristics Simulating Johne's Disease. Dunkin, G. W., and Balfour-Jones, S. E. B. (1935.) *J. Comp. Path. & Therap.* **48.** 3. 236-240.]

An account is given of a preliminary investigation into a disease occurring in a flock of sheep, the chief symptoms of the affected individuals being inappetence, diarrhœa and emaciation. Two sheep were tested by the intradermal route with tuberculin, avian tuberculin, and with two varieties of johnin. One of the sheep which was showing typical symptoms of the disease gave a positive reaction to all the reagents except to tuberculin and was destroyed eleven days after the commencement of the test. *Post-mortem* examination showed that there were no marked abnormalities of the intestinal tract except for the occurrence of black markings on the mucous membrane of the cæcum and a dark coloration of the small intestine. In smears made from the latter site there were large numbers of acid-fast organisms. The mesenteric glands were slightly enlarged and in the watery fluid which escaped on section acid-fast organisms were also demonstrated.

Attempts were made to secure cultures of the organism and for this purpose ordinary egg slopes were used as well as a medium in current use for cultivating the organism of bovine Johne's disease. After seven months, a few minute colonies were apparent on the latter medium, while on the egg medium no growth was ever observed. [According to the experience of one of the authors (G. W. D.) primary cultures of the bacillus of Johne's disease are obtained almost invariably in three months.] Subcultures of the organism were evident macroscopically in three weeks.

Post-mortem examination of five of the sheep thought to be suffering from the same disease showed that, as a rule, there was a heavy worm infestation of the intestinal tract, and the authors state that it is not unlikely that the clinical symptoms of the condition described in the case of the first sheep might have been aggravated by parasitic infection. In the opinion of the authors these findings, together with the fact that typical corrugation of the intestinal mucous membrane was absent, are characters which distinguish the condition from that of Johne's disease in cattle. S. J. E.

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[The Mules' Operation: Prevention of Blowfly Strike by Surgical Measures. Beveridge, W. I. B. (1935.) *Austral. Vet. J.* **11.** 3. 97-104.]

One of the more important factors rendering ewes susceptible to crutch strike is the soiling of the crutch with urine. Owing to various factors, the principal one being the presence of wrinkles, the skin in the crutch of some ewes is continually wetted by the urine. The continual wetting sets up a dermatitis with serous exudation which renders the ewe susceptible to crutch strike. The principle of the Mules' operation is that in most instances urine soiling of the skin can be corrected by appropriate surgical treatment. The measures advocated include:—

(1) Cutting off tails on a level with the top of the vulva at lamb-marking.

(2) Control of "scabby ulcer"—by (*a*) rubbing off scab and applying copper sulphate, and (*b*) removing wrinkles and cutting tails.

(3) Operation for straightening tips of vulva—excision of a small piece of skin from the convex side of the vulva.

(4) Removal of skin wrinkles in the crutch—by use of Burdizzo pincers (the skin is crushed at the base of the wrinkles with Burdizzo pincers and then cut off within the jaws with a knife), or, where large numbers are being treated, the wrinkles are excised with rolcut secateurs, which make the operation much more rapid.

Seddon (1935) has recorded that during the first and second year after operation about 75 per cent. and 50 per cent. less strike occurred in treated sheep than untreated controls, and Beveridge states that the cost of the operation, carried out at the time of lamb marking, is only a fraction of a penny per lamb and the well-being of the lambs was not noticed to be affected.

J. S. S.

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[Urine Soiling in Ewes in Relation to Blowfly Strike. Beveridge, W. I. B. (1935.) *Austral. Vet. J.* **11.** 3. 104-106.]

Beveridge has previously shown (1934) that unilateral crutch strike in ewes occurs more commonly on the left side than the right. An examination of 820 ewes showed that in 20 per cent. the tip of the vulva pointed to the left, and in only 8 per cent. to the right. Soiling in most sheep was worst opposite the tip of the vulva, and when unilateral generally on the side to which the tip of the vulva was deflected. It was previously thought that the causes of irregularities of the tip of the vulva were shearing cuts, but recent observations show that this was not so.

An additional important factor in urine soiling of the crutch was found to be the skin wrinkles alongside the vulva which, when well developed and covered with wool, may be wetted during urination. In the majority of cases,

however, soiling takes place not during urination but from the drop which hangs on the tip of the vulva after urination. Among other factors in soiling it was found that where clover burrs (*Medicago laciniata*) were common the wool was frequently tied across the crutch with burrs and badly soiled.

J. S. S.

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[**Observations on the Pathology of Blind Staggers and Alkali Disease.** Draize, J. H., and Beath, O. A. (1935.) *J. Amer. Vet. Med. Ass.* **86.** 6. 753-763. 12 figs. on 2 plates. 2 refs.]

It is believed that both these diseases are due to the ingestion of small quantities of toxic minerals such as selenium. Affected animals suffer from malnutrition, avitaminosis, anæmia and icterus. There is a serious disturbance of the calcium-phosphorus metabolism and bone and hoof lesions may be present. The gait is often peculiar, especially in alkali disease. *Post-mortem* examinations of one hundred cattle and sheep indicate that in both diseases the lesions are very similar. The liver is acutely congested and areas of necrosis develop. In alkali disease, atrophy and cirrhosis of the liver is pronounced. Inflammation and hæmorrhage are present in the gastro-intestinal tract and the kidneys are congested and may show a glomerulo-nephritis. A condition of atony involves the smooth muscles throughout the body and the heart is atrophied and petechial hæmorrhages on the epicardium are common in blind staggers. The authors consider that there is a sufficient difference between the symptoms exhibited by affected animals to retain the two terms used to describe these diseases.

J. A. N.

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[**Enzoötic Marasmus: the Determination of the Biologically Potent Element (Cobalt) in Limonite.** Underwood, E. J., and Filmer, J. F. (1935.) *Austral. Vet. J.* **11.** 3. 84-92.]

Enzoötic marasmus is a widespread disease in Australia, considered to be similar to "pine" in Scotland and "bush sickness" in New Zealand. The most noticeable symptoms are progressive emaciation and anæmia. Treatment with iron salts, especially limonite, had formerly been found to be the quickest cure and the condition was originally thought to be caused by iron deficiency in the diet. More recent work by the above authors had shown that enzoötic marasmus could be cured by treatment with hydrochloric acid extracts of limonite from which all but negligible quantities of iron had been removed, thus showing that the curative principle in limonite was not the iron but some other biologically potent element. The present paper deals with a more detailed examination of the iron-free extracts of limonite. After much painstaking chemical analysis it was found that the best curative results were obtained by the fraction containing zinc, cobalt, nickel and manganese. Subsequent experiments carried out by treating cases of the disease with these four elements separately and in combination one with another have definitely shown that the potent element is cobalt and so far seven sheep have been cured by traces of this element. The authors theorise that future work will show that enzoötic marasmus is due to deficiency of cobalt in the food and suggest that it would be worth while investigating similar diseases in other countries from this point of view. The above work is also valuable in confirming that cobalt must be regarded as an essential element in animal nutrition.

J. S.

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[**Sterilisation of the Trocar and Cannula after taking a Sample of Mucus from the Trachea of a Case of Tuberculosis.** Drs. Eickmann and Schopen. (1935.) *Deuts. tierärztl. Wschr.* **43.** 5 and 6. 73-75 and 93-94.]

In Germany, veterinary surgeons examining suspected cases of advanced tuberculosis in cows sometimes take specimens of mucus from the trachea. The State provides a sterilised cannula for each case, but the veterinarian provides his own trocar, which he must sterilise himself after each case.

A common method of carrying out the sterilisation of the trocar is to wash it in water, dry it, and then to dip it in methylated spirit, which is then ignited. The authors undertook investigations to show whether or not this method is effective.

By guinea-pig inoculation, using a sufficient number of experimental animals, they showed that:—

(1) The trocar is very liable to become contaminated by *M. tuberculosis.*

(2) The common method of sterilisation mentioned is insufficient. (In ten cases three guinea-pigs developed tuberculosis.)

(3) Boiling for ten minutes, with or without flaming, is effective.

(4) Washing in hot 2 per cent. caustic soda solution, followed by flaming by the method described, is effective.

E. W. A.

At the quarterly meeting of Cornwall Accredited and Graded Milk Producers' Association, it was announced that all producers on the accredited roll with ten cows or under would receive free veterinary inspection, and those producers with larger herds would pay a small fee to be agreed upon between the veterinary surgeons and the County Council.

Reviews

[A. C. McCandlish and A. N. Black: **"The Relative Values of Raw and Pasteurised Milk in Calf-feeding."** Research Bulletin No. 4—Milk Production Department—West of Scotland Agricultural College. Sept., 1935. (pp. 65 with 1 plate.)]

It is now common knowledge that those who have given time and thought to the complex question of a safe milk supply for human consumption and of the nutritional value of milk, are divided into two schools of thought; one group favours pasteurisation of all milk destined for human consumption, the other advocates that a clean supply of raw milk should be the ideal. The problem is by no means simple. Much can be said on either side; theoretical contentions are frequently used which upon examination prove to be inaccurate. In the present publication, the authors have investigated one aspect of the complex subject—the feeding of calves, and have performed a service in collecting and summarising available literature relating to other aspects of this vexed question.

The bulletin is divided into three main sections—a review of literature, the experimental work undertaken, and a discussion of results. Of these the second and third only need concern the present review; those who wish to study the literature are recommended to study the bulletin or, better, the original papers.

Nevertheless, it must be mentioned here that the authors have criticised the results of some previous work and shown that it is not possible to base any conclusions upon results of experiments with calves where animals of different breeds were used, where the raw and pasteurised milks were fed to calves of different ages, or where comparisons were made between groups of calves when relationships between the experimental feeding period and the developmental stages of growth were disregarded. For one or more of these reasons, many reports of feeding trials with raw and pasteurised milk which have hitherto been accepted as showing that there was no difference in results, or that raw milk was definitely inferior to the pasteurised article, must now be disregarded since they do not contribute any real knowledge to the subject. It is shown that the work on small animals is somewhat scanty, and that helpful conclusions cannot be drawn from it, other than that, as might be expected, raw milk appears to be better than pasteurised, and that if the recent work by Mattick and Golding is confirmed, it will have been shown that the use of pasteurised milk has a more marked retarding effect on males than on females.

The Experimental Work

The authors, in planning their experiments, took precautions to avoid such mistakes in technique as had already been shown might nullify their results or lay them open to criticism. The calves were from a herd of Ayrshire and British Friesian cows, and provided they were of normal health and size, were put under experiment from birth onwards. Thirty-five calves in all were used—6 British Friesians, 27 Ayrshires and 2 Ayrshire-Friesian crosses. The Friesians were all sired by the same Friesian bull, and the crosses and 8 of the Ayrshires were by an older Ayrshire bull.

The calves were housed under good hygienic conditions in a modern calf-house and the experiment ran from December, 1932, to August, 1933.

The allotment of the animals is important. They were divided into 10 groups of 3 or 4 each. This allotment is best shown by the following table taken from the bulletin.

Group Number.	Sex.	Number of Calves.	Number of Days Dam's Raw Milk Fed after Calving.	Raw or Pasteurised Milk Fed Later.	Time on Trial in Days.
I	Male	4	10	Raw	150
II	Female	3	10	,,	,,
III	Male	4	5	Pasteurised	,,
IV	Female	3	5	,,	,,
V	Male	4	10	,,	,,
VI	Female	3	10	,,	,,
VII	Male	3	5	Raw	120
VIII	Female	3	10	,,	,,
IX	Male	4	5	Pasteurised	,,
X	Female	4	10	,,	,,

The milk used was the bulked milk from a number of cows in the herd. It was taken and divided into two portions—one half was used for the calves getting raw milk and the other was pasteurised in a specially-made double-jacketed 25-gallon vat, at 145° to 150°F. for 30 minutes, and cooled immediately afterwards. The average butter-fat content throughout the trial was 3·88 per cent., and a weekly bacteriological examination was carried out to act as a check on the efficiency of pasteurisation.

From 21 days onwards hay *ad lib.* and grain

mixture were fed, all groups being treated alike. The amounts of milk and of grain mixture fed were graded according to body weight, each animal reaching a maximum daily consumption of 15 lb.

The calves were weighed at birth and every 10 days subsequently, and body measurements were made, though, owing to technical difficulties, data from these latter were not used.

The results show that the raw-milk-fed bull calves in Group I made an average daily live weight gain of 2·03 lb., while those on pasteurised milk in Group V, with which they are comparable, made a gain of 1·98 lb. These had all been on dam's milk for 10 days after birth before the experimental milk feeding was commenced.

In the similar Groups III and VII[1]—which differ from the above only in having dam's milk for 5 days—the average daily live weight gains were: raw milk group, 1·72 lb.; pasteurised, 1·96 lb.

The greater growth rates of calves receiving their dam's milk containing colostrum, for a longer time (10 days against 5 days) is noteworthy, and is one more instance of the importance of ensuring that calves should be given colostrum-containing milk for as long a period as possible. In the experiment, the average daily live weight increase of all calves receiving colostral milk for 10 days was: 1·894 lb.; while those only getting it for 5 days averaged 1·845 lb., irrespective of whether they were given raw milk or pasteurised subsequently.

It is difficult to analyse briefly the whole of the data, but the essential fact which emerges is that on a basis of daily live weight gain, the average recorded for all the animals on raw milk was 1·882 lb., while all animals receiving pasteurised milk made an average daily gain of 1·870 lb. throughout the experiment.

The summary of the incidence of disease among the two groups shows that among the raw-milk-fed groups there was a total of 4 calves affected for 12 days, while among the calves fed on pasteurised milk, 10 calves were affected for 94 days. A lower incidence of disease (mainly white scour and navel-ill) among the calves getting dam's milk with a colostrum content for 10 days over those only getting it for 5 days was also demonstrated.

So far as tuberculosis was concerned, all the heifers were subjected to the tuberculin test, and among the raw-milk-fed groups one failed to pass, while among the pasteurised groups two failed and one was suspicious. It is, of course, impossible to form conclusions on these animals regarding differential resistance to tuberculosis since, though the calves came from a herd which contained reactors, so many other factors, such as exposure to infection, inherited resistance, etc., must be taken into consideration.

Discussion of the changes which occur in milk when it is pasteurised is given, from which it is shown that there is some coagulation of the albumin and globulin, digestibility of the casein is lowered, the content of available iodine, calcium, and phosphorus is reduced, while that of iron is probably lowered. The vitamin content of the milk is discussed, but apart from the previously-known fact that the content of vitamin B complex is probably reduced, and that vitamin C is at least reduced in value if not destroyed, little new knowledge is added.

It is pointed out, however, that antibodies present in colostrum are probably destroyed, and that hypothetical milk enzymes and the bactericidal powers of milk are destroyed by pasteurising, while the lactic acid organisms required to control harmful bacteria in the alimentary canal are totally destroyed.

It must be admitted that while the work done throws much further light upon certain aspects of the vexed question of whether or not raw milk is better than pasteurised, the question is by no means finally settled, and many of the problems remain to await further investigation. The bulletin, however, is well worth careful study.

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[Martindale and Westcott. **"The Extra Pharmacopœia."** Vol. II. 20th edition. 776 pages + index. The Pharmaceutical Press. Price 22s. 6d.]

To those already familiar with "Martindale" it is only necessary to draw attention to the recent publication of the 20th edition of volume II, which forms a companion work to volume I, the equivalent edition of which was published in 1932. The same plan is followed as formerly, the changes being of a revisionary character, bringing material up to date to conform with the B.P. 1932, legal changes and recent research work. From this it will be gathered that much rewriting and enlargement has been necessary.

The title "Extra Pharmacopœia," while it admirably fits volume I, which deals principally with the preparation, action and uses of drugs, does not adequately indicate the wide field covered by the work now under review. Information has been gathered in all branches of medicine, using the term in its fullest sense. The plan adopted in each instance is the clear condensation of known facts combined with a selection of references for those in need of further information. We thus find articles on subjects as diverse as the preservation of foods and actinotherapy.

The sections most serviceable to veterinarians are as follows: (1) Laboratory Aids to Diag-

nosis. This is one of the largest sections, covering 60 pages. Details are given of the analytical and microscopic tests which may be applied to urine, blood, fæces, etc. Some of the more peculiarly veterinary problems, such as the examination of skin scrapings, are omitted. In view of the detail given to other tests it is somewhat surprising that the sugar flotation method for the detection of nematode eggs in fæces is not described. (2) Milk (45 pages). This includes the chemical and bacteriological examination, a discussion on pasteurisation, and a résumé of the legislature. (3) Vitamins (25 pages). A discussion on the chemistry of vitamins and their clinical application. (4) Water (19 pages). This includes instruction on the collection of samples and details of chemical and bacteriological tests to be applied.

The index at the conclusion of the book refers to information in both volumes. An indication of the importance of the publication is given by the fact that it is published at the instance of the Pharmaceutical Society of Great Britain, which body has acquired the rights following upon the death of Dr. Martindale.

PROTECTION OF THE FLORA AND FAUNA OF AFRICA

"On January 14th the articles of the Convention for the Protection of the Fauna and Flora of Africa, which was signed in London by the delegates of nine Governments on November 8th, 1933, will become effective in the African territories of five of its signatories," says *The Times*. "These are the United Kingdom and Northern Ireland, the Union of South Africa, the Anglo-Egyptian Sudan, Egypt, and Belgium. It was agreed that the Convention should be ratified within two years, and that it should come into force in the African territories of each State which had ratified it three months after its ratification by the last of at least four of the signatory Governments.

"The Government of the Anglo-Egyptian Sudan having ratified it on October 14th, the Convention will become operative in a great part of Africa—comprising the Belgian Congo, Egypt, and the Eastern Sudan, the South African Union, Nigeria, and the other British Crown Colonies and mandated territories in less than six weeks' time.

"The Governments which signed but have not yet ratified the Convention are those of France, Italy, Spain, and Portugal. The Abyssinian delegate at the Conference did not sign the Convention as he was awaiting the study of its contents by his Government, who have taken no further action in the matter. Italy may now be less anxious for the protection of African wild life, and Spain has many other other preoccupations. In France, however, a Bill for the ratification of the Convention awaits the consent of Parliament, and it is understood that the Portuguese Government have decided in favour of ratification. It is to be hoped that these two Governments will not delay action too long. Their African possessions contain many local and peculiar forms, such as the "foussa" of Madagascar; and the larger African wild animals have been decreasing markedly in all but a few protected areas ever since the War."

Dominion Reports

DEPARTMENT OF AGRICULTURE, CANADA

Report of the Veterinary Director-General for the Year ending March 31st, 1935

The report of the Veterinary Director-General for the Department of Agriculture, Canada, gives us the customary concise description of veterinary affairs in the Dominion which we have come to expect from Dr. George Hilton.

It is pleasing to note that 26·5 per cent. of the cattle population, comprising over two-and-a-quarter million head, are subject to the tuberculin test, and many new herds have been accepted under the accredited and supervised herd plans.

Research into the following diseases has been continued at the Animal Diseases Research Institute at Hull: tuberculosis, Bang's disease, mastitis, diseases of reproduction, bovine redwater, and distemper of foxes and other fur-bearing animals. Anti-distemper and anti-abortion sera have been prepared and are being used in experimental field trials.

There has been a material increase in the routine and diagnostic laboratory services which have been carried out at the branch laboratories at the Central Experimental Farm, Ottawa, and also at Lethbridge.

Canada, according to the report of the Chief Veterinary Inspector, has been free from dourine for the past 15 years and is still in this happy state.

The exact position in regard to bovine tuberculosis is given in considerable detail in this section of the report, each province being tabulated separately.

The Pathological Division, under the direction of Dr. E. A. Watson, has dealt with a variety of problems including diagnostic reagents and anti-sera, while on the strictly research side tuberculin and its nature and properties, tuberculo-allergy, variability of type of the tubercle bacilli, vaccination, and susceptibility and resistance in cattle, are being investigated. Distemper and encephalitis in foxes and other fur-bearing animals is also dealt with, while a special point is made of study of five important acute swine infections.

It is always a difficult matter to review adequately annual reports and this is no exception. The one under consideration should be read to be appreciated, especially by those veterinarians engaged in administrative duties connected with the control of contagious diseases.

G. W. D.

DEPARTMENT OF AGRICULTURE, NEW ZEALAND

Report on the Work of the Livestock Division, 1934-35

It speaks well for the organisation concerned, that the report of the whole of the agricultural work of the Dominion, for the year ended March 31st last, can pass through all its stages, and be available for review, in such a short period. It is obvious that the necessity for placing the information obtained before those who are interested, with the least possible delay, is appreciated.

The general health of animals has remained good. It is noteworthy that the economic value of the heavy draught animal, as compared with mechanical traction, is admitted. This has led to continued interest in the breeding of Shire horses. On the other hand, the position of the lighter breeds is said to be almost disquieting, particularly with respect to suitable remounts. Very considerable development is taking place in the pig industry, as a sideline to dairying. It has been shown that 40 lb. of pig meat can be obtained for each 100 lb. of butterfat produced and the value of the former, exported during the year, was over £1,000,000.

As regards disease, with the exception of tuberculosis and abortion, the major diseases of stock are absent. The number of cattle found to be affected with the former, at abattoir inspections, was 5·54 per cent. In a country in which dairying is of such prominence, abortion is of importance. There was no undue incidence during the year; nevertheless, the disease is widely disseminated. Importance is attached to a disease of sheep known as "facial eczema": the precipitating factor is the change from dry feeding to luscious grass following the rains. There is an eczema-like condition of the skin and the liver becomes cirrhotic.

Diagnostic and investigational work is carried out at Wallaceville and Hamilton. The former includes the examination of milk, whey, and blood samples and the analysis of bone fertilisers. Doses of vaccine and tuberculin to the number of 39,277 were produced. Research is in progress in respect of mastitis, sterility, and grass staggers, all of importance to dairying. Arthritis, facial eczema, myotic dermatitis, rickets, and other diseases of sheep are under observation as are various affections of pigs and poultry. Nutritional experiments, devoted to attempts to increase the blood magnesium of cows, and to dietary as a factor in steriiity, continue.

The report demonstrates that the staff is awake to the problems of the country and is tackling them in an eminently practical and scientific manner.

J. S.

N.V.M.A. Divisional Report

YORKSHIRE VETERINARY MEDICAL SOCIETY*

MEETING AT LEEDS

A General Meeting of this Division was held at the Hotel Metropole, Leeds, on Friday, October 25th, 1935, when the President, Mr. A. H. Watson, occupied the chair. The following members signed the attendance book: Messrs. A. D. J. Brennan, J. Clarkson, W. A. Campbell, W. Halstead, W. T. McGregor, E. Ackroyd, D. V. Sinclair, Lieut.-Colonel J. A. Dixon, Lieut.-Colonel H. G. Bowes, Messrs. E. G. Duncan, J. M. McKellar, A. Cruickshank, H. M. Salusbury, J. W. Procter, W. R. McKinna, R. S. Smyth, Major D. S. Rabagliati, Major C. Holland, Mr. F. C. Scott and the Hon. Secretary. As visitors there were present: Messrs. J. O. Powley, J. P. Pickering, D. W. Corbett, A. J. Adams, W. J. Guthrie, H. A. Idenden and S. C. Young. Apologies for inability to attend the meeting were intimated from Messrs. G. H. Livesey, A. J. McCarmick, A. McCarmick, Professor J. B. Buxton, Messrs. G. V. Tyerman, A. Robertson, Dr. O. C. Bradley and Mr. A. W. Noel Pillers.

Correspondence.—Following the adoption of the minutes of the last meeting, the Secretary read a letter from Mr. George E. Bowman, a past-president of the Society, who stated that owing to illness and advancing years he would be unable to attend the meeting, and requesting the President and members of the Society to accept his resignation. Mr. J. Clarkson spoke in high terms of the membership of Mr. Bowman and pointed out that he was one of the oldest members of the Society. Mr. Clarkson further observed that for the reasons stated in his letter the Society would with sincere regret accept Mr. Bowman's resignation, but he proposed that the highest honour of the Society be conferred upon him, namely, that of Honorary Associateship. The President endorsed everything that Mr. Clarkson had said regarding Mr. Bowman and his membership of the Society and stated his great pleasure in seconding the motion that Mr. Bowman be elected an Honorary Associate of this Division. The motion was then put to the meeting and was carried unanimously.

The Secretary then read a letter from the General Secretary of the N.V.M.A. regarding the rules governing the award of the "Dalrymple-Champneys'" prize (a copy of these rules had been circulated to each member of the Society). Major Rabagliati made a strong appeal to the members to look through the literature and consider the nomination of one or more members of the veterinary profession

* Received for publication November 11th, 1935.

for the prize in question and he proposed that the matter be considered and nominations brought forward at the April meeting of the Society. This resolution was passed unanimously.

A letter from the General Secretary of the N.V.M.A., with reference to the anxiety of the "National" to bring into membership of that body those members of Divisions who at present do not belong to the Association, was next considered, and the Secretary reported that there were five such members of the Yorkshire Division and that, acting on the instructions of the Council, he had addressed a letter to each of the members mentioned pointing out the advantages of membership of the "National" and urging them to consider the advisability of joining the parent body. The Secretary was instructed to write to the General Secretary of the N.V.M.A. and inform him of the action taken in the matter. A letter from the General Secretary was also read regarding a resolution of the Council of the Association with reference to the question of divisional representation on the Council of the N.V.M.A. The contents of this letter were noted and the Secretary was instructed to write to the General Secretary informing him accordingly. A letter from the General Secretary enclosing a report of the Special Committee on Fur-bearing Animals, etc., was also considered, and the members were informed that copies of the report would be supplied to any members interested on application to the Hon. Secretary. Two letters from the General Secretary of the N.V.M.A. were then read with reference to two resolutions of the Yorkshire Division regarding (1) the publication of advertisements in *The Veterinary Record* from firms which supply laymen, and (2) the use of the objectionable abbreviation "vet." by members of the public when referring to members of the veterinary profession in the press or by public announcement, and whilst the meeting was in agreement with the action taken by the Council of the N.V.M.A. on the latter resolution, the members present expressed the view that the action taken regarding the former was very unsatisfactory, and the Secretary was instructed to write to the General Secretary and inform him of the dissatisfaction of the Society on the matter referred to.

The Secretary then read a letter from the General Secretary of the N.V.M.A. with reference to the nomination by this Division of six members to serve on the Provisional Committee of the 1936 Congress to be held at Scarborough. The President informed the meeting that in view of the urgency of this matter it had been considered by the Council of the Society and the following members had been nominated: Messrs. H. G. Bowes, J. A. Dixon, F. C. Scott, D. S. Rabagliati, A. H. Watson and E. F. McCleery. The President further informed the members present that the Provisional Committee had met at York on Friday, October 18th, and had decided that the Congress should be held during the period September 14th to 18th inclusive, and that Mr. E. F. McCleery had been appointed Hon. Local Secretary for that function. The meeting expressed its approval of the action taken by the Council of the Society.

Election of Members.—On the proposition of the President, seconded by Mr. J. W. Procter, the following gentlemen were elected as members of the Division: Messrs. A. D. J. Brennan, M.R.C.V.S., Leeds; A. Robertson, M.R.C.V.S., Bradford; H. M. Salusbury, M.R.C.V.S., D.V.H., Sheffield; Major J. Sheffield, M.R.C.V.S., Howden, and Major C. Holland, M.R.C.V.S., R.A.V.C. The following gentlemen were then nominated for membership: Messrs. A. K. Withers, B.Sc., M.R.C.V.S., Harrogate; A. J. Adams, B.Sc., M.R.C.V.S., Halifax, and J. O. Powley, M.R.C.V.S., Harrogate.

Finance.—On the proposition of Lieut.-Colonel H. G. Bowes, seconded by Mr. W. A. Campbell, the Treasurer's Financial statement was adopted, and it was decided on the proposition of Mr. W. R. McKinna, seconded from the chair, that the list of members as published be examined by the Council to ascertain the number of defaulting members and what action, if any, should be taken. The balance sheet of the Annual Dinner and Dance was also adopted. On the proposition of Mr. J. Clarkson, seconded by Major D. S. Rabagliati, it was agreed that the matter of the allocation of the balance of £6 4s. 9d. from the latter function be considered at the January meeting of the Society and that this matter be placed on the Agenda of that meeting.

Election of Officers

The following officers were elected for the ensuing year.

President.—Major D. S. Rabagliati.

Vice-Presidents.—Mr. A. H. Watson, Lieut.-Colonel J. A. Dixon and Mr. W. R. McKinna.

Hon. Treasurer.—Mr. F. C. Scott.

Hon. Secretary.—Mr. E. F. McCleery.

Auditors.—Mr. W. Crawford and Lieut.-Colonel H. G. Bowes.

Council.—Messrs. E. Ackroyd, A. D. J. Brennan, W. A. Campbell, W. Halstead, J. McKellar, J. W. Procter, G. V. Tyerman and G. Whitehead.

Paper.—The President now called on Professor W. M. Mitchell, M.C., T.D., M.B., Ch.B., B.Sc., M.R.C.V.S., to read a paper on "The Problem of 'Rheumatic Disease' (Osteo-Arthritic and Allied Conditions) in the Horse." Professor Mitchell received a very enthusiastic welcome to the meeting, and he read a very interesting paper to a most attentive audience. At the conclusion of the paper there was a keen and instructive discussion in which the following

members took part: Messrs. Watson, Procter, Scott, Rabagliati, Campbell, McKinna, Powley, Salusbury, Idenden, Brennan, Bowes and Clarkson, and Professor Mitchell then replied to the points raised in the discussion. On the motion of the President a very hearty vote of thanks was accorded to the lecturer. [Professor Mitchell's paper is reproduced at the commencement of this issue of the *Record*.—*Editor*.]

Induction of President. — Major D. S. Rabagliati was then inducted to the Presidential Chair amid applause. Having thanked the members for the honour they had conferred upon him, Major Rabagliati proposed a hearty vote of thanks to the retiring President for his services during his two very successful years of office. The proposal was carried with acclamation. Mr. Watson suitably replied. The President then brought before the meeting the fact that the Annual Congress of the N.V.M.A. was to be held at Scarborough next year during the period September 14th to 18th inclusive, and stated that on previous occasions the Division in whose area this function had been held had arranged an "At Home" on the day preceding the official opening of the Congress. Several of the members spoke in favour of a similar function being arranged in 1936, and on the proposition of Colonel Bowes, seconded by Mr. A. H. Watson, it was agreed that the matter be placed on the Agenda for the January meeting and be then discussed.

The Secretary then reported that owing to the extra work involved in arranging matters for the Scarborough Congress, he very much regretted having to discontinue his attendance at the Leeds Branch of the R.S.P.C.A. Dispensary. He was instructed to discuss the matter with Mr. A. J. McCarmick, M.R.C.V.S., and report to the next meeting of the Council of the Division.

E. F. McCleery, *Hon. Secretary*.

Examiners in Veterinary Science, University of London

At the November meeting of the Senate of the University of London, Dr. E. C. Amoroso was appointed as an additional Internal Examiner to conduct the histological portion of the examination in Veterinary Anatomy at the Second Examination in Veterinary Science, Part II, for Internal and External Students in December, 1935.

The following were appointed to act as Examiners for the Second, Part II, and Final Examinations in Veterinary Science for Internal and External Students in 1936:—

Veterinary Anatomy.—J. McCunn (Lecturer at R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Physiology.—W. L. Symes (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Hygiene.—G. H. Wooldridge (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

Veterinary Pathology.—F. C. Minett (R. Vet. Coll.) (*Chairman*); and the External Staff Examiner.

From *The Veterinarian*

December, 1835.

Veterinary School of Alfort: Extract from the Report of the Proceedings during the Scholastic Year 1834-35

Among the diseases that have come under notice Glanders has, as usual, occupied the chief place. Our attempts to cure chronic confirmed glanders have, as heretofore, been altogether fruitless. There never can be a radical cure in this stage of the disease. The prevention of this malady should occupy the chief study of the veterinarian. Three cases have occurred in which it was evidently caused by the reabsorption of pus.

It is a most important question, how far glanders is contagious. Government has yearly expended enormous sums under the belief that it may be contagious. All the observations which the Director has been enabled to make, and the documents which have been communicated to him by veterinarians, civil and military, and the information which he has obtained from extensive breeders, have confirmed the doubts which he has always entertained, in common with the majority of veterinarians, as to the contagiousness of this disease. A great service would be rendered to the country if, by means of experiments conducted on a large scale, this question could be set at rest. A sum of no great magnitude would put an end to all the incertitude, we had almost said those unfounded errors, which have been so injurious to the interests of the Army and of agriculture.

Toxicology.—At the commencement of the year M. Renault, in conjunction with the Professor of Chemistry, instituted a course of experiments on poisoning with arsenic. Their object was to ascertain the effect of arsenic on the economy, and the degree in which we could rely on the hydrate of the peroxide of iron as an antidote: the result of the experiments was:—

(1) That, as it regards the horse, the arseniate of arsenic was a more active poison than the arsenious acid.

(2) That two horses could take, without being seriously affected, the one an ounce, and the other an ounce-and-a-half of arsenious acid, while five others were destroyed by similar doses.

(3) That ecchymoses, sometimes extensive and numerous, in the bladder, and particularly traces of acute inflammation under the serous membranes of the cavity of the heart, with erosion of the mucous membrane of the right side of the stomach, and also of the cæcum, and sometimes the colon, are the usual lesions of this kind of poisoning.

(4) That however serious may be the lesions of the large intestines, chemical analysis has demonstrated traces of the poison only in two cases out of seven; while in all of them there has been found a sufficient quantity of the poison in the contents of the stomach.

(5) That when the hydrate of the peroxide of iron has been swallowed immediately or very soon after the arsenic, there has been good reason to hope for success.

Animal Chemistry.—Some new and interesting researches have been made into the composition of the brain, and particularly of the white or medullary, and the grey, or cineritious substances of which that organ is composed.

In Parliament

The following questions and answers have been recorded in the House of Commons recently:—

Horse-Drawn Vehicles, London

Lieut.-Colonel Moore asked the Minister of Transport whether, in view of the anxiety which has been caused to horse-breeding interests and users of horse transport by his recent statement with regard to the elimination of horse transport in London, he can now state whether he is prepared to change his policy in this direction and to permit any transition in this respect to take place naturally and as determined by economic considerations?

Mr. Hore-Belisha: I have never, so far as I am aware, said that I propose to eliminate the horse in London. I have, however, recently made inquiries of the largest users of horse-drawn vehicles in Central London as to the rate of progress which might be expected or would be practicable in the substitution of mechanical for horse-drawn traffic, and I can assure my hon. and gallant Friend that I shall give the closest consideration to any representations I receive from those affected. I take the view that the presence during the daytime of slow-moving horse-drawn traffic on some of the more important streets in London slows down other and faster moving traffic and adds to congestion.

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National Stud

Mr. Hall-Caine asked the Minister of Agriculture the nature of the discussions which have taken place between representatives of the British Government and the Free State Government for the transference of the National Stud in county Kildare to the Free State; and whether any decision has been reached?

The Minister of Agriculture (Mr. Elliot): I am not able to add anything to the official announcement on this subject which appeared recently in the Press. I am sending a copy of this announcement to my hon. Friend.

Captain Heilgers: Will my right hon. Friend bear in mind that, if any transference takes place, the only possible place for the Stud in this country is Newmarket?

Horse Breeding (Totalisator Fund)

Mr. Hall-Caine asked the Home Secretary whether, in view of the fact that the totalisator turnover for 1935 is to exceed £6,000,000 as compared with £4,000,000 in 1932, he can state whether arrangements can now be made for substantial assistance to all sections of British horse-breeding from this source to be given in accordance with the provisions of Sub-section (6) of Section 3 of the Racecourse Betting Act of 1928, with a view especially to reducing the menace of foreign competition, as shown by the increasing imports of foreign horses into this country?

Mr. Lloyd: The function of the Secretary of State is limited to approving schemes, prepared by the Racecourse Betting Control Board, for the application of the moneys from time to time comprised in the totalisator fund for the purposes specified in Section 3 (6) of the Racecourse Betting Act, 1928. In pursuance of this provision, grants of £2,000 and £5,000 have been made to the Hunters Improvement and National Light Horse Breeding Society to be awarded as premiums in 1934 and 1935 respectively for thoroughbred stallions and my right hon. Friend has recently approved a scheme for the grant of £5,000 for the year 1936 for the same purpose. The Board are aware of their power to propose grants to all sections of British horse-breeding and will bear this in mind when preparing schemes for the application of moneys from the totalisator fund.

Mr. Anstruther-Gray: Have any grants to veterinary colleges been approved, and if not can we have an assurance that that question will be borne in mind?

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Veterinary Colleges

Mr. Anstruther-Gray asked the Home Secretary whether he has approved any recommendations by the Racecourse Betting Control Board for a grant to assist veterinary colleges?

Mr. Lloyd: I am informed by the Racecourse Betting Control Board that they are at present in consultation with the Agricultural Research Council on this question and will consider whether to include in schemes to be submitted to the Secretary of State for approval any grant in respect of research into disease among horses.

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Foot-and-Mouth Disease

Brigadier-General Brown asked the Minister of Agriculture whether the recent outbreaks of foot-and-mouth disease have now been checked; and what is the present position (December 9th)?

Mr. Elliot: The outbreaks of foot-and-mouth disease in the counties of Cheshire and East Sussex confirmed on November 26th and November 27th respectively, have fortunately each been confined to the single case. If no further outbreaks occur it is proposed to reduce the areas under restrictions in those counties to one of five miles radius from December 11th in the case of Cheshire and December 12th in the case of East Sussex, and to release the two areas altogether about a week later.

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Milk Order

Mr. T. Williams asked the Minister of Health whether he has received any complaints regarding the draft of the new Milk Order; and, if so, will he state the source of the complaints and his reply?

The Minister of Health (Sir Kingsley Wood): I have received representations from a large number of sources on various points arising on

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A given quantity of the medullary substance contained 14 times as much white fatty matter as an equal weight of the cineritious, and a less proportion of water. This, which had been proved in the human brain, was found to be the case in the brain of the horse.

In some provinces of Normandy the farmers employ whey kept until it is putrid for the cure of red-water in cattle. The professor of therapeutics being informed of this, endeavoured to ascertain the composition of this fluid; and he found that it contained subcarbonate, and acetate, and a little hydro-sulphate and ulmate of ammonia. These ammoniacal products, and which are found to a greater or less extent in all animal matters undergoing the process of putrefaction, are, without doubt, the principal agents in the cure of red-water when this whey is employed: it will, therefore, be advisable to try these pure ammoniacal preparations as a cure for this complaint.

the draft order. I am at present considering these representations in consultation with my right hon. Friend the Minister of Agriculture, and I hope shortly to issue a revised draft of the order.

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MILK AND POULTRY COMMISSIONS (REPORTS)

Sir PERCY HURD asked the Minister of Agriculture, when the reports of the Milk Reorganisation Commission and the Great Britain Poultry Commission will be available?

Mr. LAMBERT asked the Minister of Agriculture when the report of the Milk Marketing Commission will be available?

The MINISTER of AGRICULTURE (Mr. Elliot): I have just received the report of the Great Britain Reorganisation Commission for Eggs and Poultry, and hope that it will be possible to publish it early next week. It is expected that the report of the Milk Reorganisation Commission will not be available for some months.

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WARBLE-FLY

Mr. GRAHAM WHITE asked the Minister of Agriculture whether it is his intention to take action to prevent the ravages of the warble-fly; and, if so, whether he can give this House an indication of the nature of his proposals?

Mr. ELLIOT: The Governments of the United Kingdom, of Northern Ireland and of the Irish Free State have agreed in principle to the desirability of the issue of Orders requiring the treatment of cattle infested with the warble-fly maggot periodically during the months of March to June in each year by methods to be prescribed in the Orders. I am now considering the terms of the Order for Great Britain.

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SHEEP SCAB

Mr. W. ROBERTS asked the Minister of Agriculture whether his attention has been drawn to the inconvenience caused by the double-dipping regulations to sheep farmers on the Cumberland - Northumberland border; and whether, in order to lessen these border difficulties, he can see his way to delimit an area less in extent than the county of Cumberland, in which the double-dipping order would remain compulsory?

Mr. ELLIOT: The answer to the first part of the question is in the affirmative. The regulations referred to are necessary to prevent the introduction of sheep scab from the remainder of Great Britain into Scotland and Northumberland, which, after a vigorous campaign of double-dipping, are comparatively free from the disease. Four fresh outbreaks of this disease have been confirmed this month near the southern borders of Cumberland and Northumberland, and, in view of the normal freedom of movement of sheep throughout Cumberland, any delimitation of an area by a boundary other than the well-recognised county boundary would, I believe, cause more inconvenience than it would obviate and would materially increase the risk of the spread of disease. I regret, therefore, I am not able to adopt the suggestion made in the second part of the hon. Member's question.

Mr. THORNE: Is there any protection for the people who handle the sheep dip, because it is a very dangerous substance?

Sir FRANCIS ACLAND indicated dissent.

Mr. THORNE: Oh, yes it is.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Dec. 17th.—Annual General Meeting of the North Midland Division, N.V.M.A., at Sheffield, 4 p.m.

Dec. 20th.—Meeting of the N.V.M.A. Advisory Committee on Poultry Diseases, at 2, Verulam Buildings, Gray's Inn, W.C.1, 2.30 p.m.

Dec. 23rd.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4 p.m.

Dec. 23rd.—All changes of address to be reported to Registrar, R.C.V.S.

1936

Jan. 6th.—N.V.M.A. Committee Meetings.

Jan. 7th.—N.V.M.A. Council and Committee Meetings.

Jan. 8th.—R.C.V.S. Committee Meetings. V.V.B.F. Council Meeting.

Jan. 9th.—R.C.V.S. Committee Meetings.

Jan. 10th.—R.C.V.S. Committee and Council Meetings.

Sept. 14th-18th.—N.V.M.A. Annual Congress, Scarborough.

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VICTORIA VETERINARY BENEVOLENT FUND

Christmas Gifts

The Secretary of the Fund has received donations amounting to £21 in response to his appeal. This will permit of gifts of 10s. to each recipient on the books. It is hoped that further donations will be received in order that a minimum grant of £1 may be made in each case. Remittances to the Secretary at 10, Red Lion Square, London, W.C.1, will be thankfully received.

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PERSONAL

Mr. G. B. Purvis asks his friends to note that his address for the time being is care of The Standard Bank of South Africa, Grahamstown, Cape Province, South Africa.

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Appointments.—Captain F. F. Horton, B.Sc., M.R.C.V.S., Mr. T. Y. Littler, M.R.C.V.S., and Mr. J. S. Steward, F.R.C.V.S., D.V.S.M., have been appointed Assistant Veterinary Officers for the County of Kent. They will take up their duties on January 1st next, and for the purpose of allocating those duties, the County Veterinary Officer has been directed to divide the county into three districts, with centres at Canterbury, Maidstone and Tonbridge respectively.

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On Leave.—The following Veterinary Officers arrived home on leave from the Colonies and Protectorates during November: Messrs. W. A. Burns (Tanganyika Territory), P. L. Le Roux (N. Rhodesia) and R. W. Sainsbury (Nigeria).

R.C.V.S. OBITUARY

GREGG, Richard, 31, Great James Street, Londonderry. Graduated Dublin, December 14th, 1921; died November 28th, 1935, aged 37 years.

McLEAN, John, 13, Cranmore Avenue and 71 and 75, May Street, Belfast. Graduated Glasgow, January 4th, 1888; died December 4th, 1935, aged 69 years.

SCOTSON, Abraham, De Aar, London Road, Sittingbourne, Kent. Graduated New Edinburgh, May 23rd, 1901; died December 2nd, 1935, aged 63 years.

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MR. JOHN McLEAN, M.R.C.V.S.

A popular figure in Irish veterinary circles, Mr. John McLean, M.R.C.V.S. had carried on his professional practice at May Street, Belfast, for approximately 30 years.

Born at Ballyutoag, Ligoniel, Mr. McLean received his early education in Belfast, and graduated in 1888 at the Glasgow Veterinary College. His first practice was at York Street, Belfast, but it was at his May Street headquarters that he built up an extensive business. A leading authority on cattle diseases, Mr. McLean was consulted extensively by farmers in all parts of Northern Ireland.

He was a former veterinary inspector to the Antrim County Council, and latterly held the appointment of inspector to the Belfast Union under the Dairies and Cowsheds Order. He was also civilian veterinary officer to the 36th Ulster Division before the division went to France. He was a valued member of the congregation at May Street Presbyterian Church, Belfast.

Mr. McLean is survived by his wife, a son, and three daughters. His son is Mr. Alexander McLean, city veterinarian, Belfast.

On Mr. McLean's retirement, four years ago, his May Street practice was taken over by Mr. A. McFarlane, formerly of Ballynahinch.

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GENERAL OBITUARY

PROFESSOR CHARLES RICHET

Professor Charles Richet, the physiologist, poet, psychologist and novelist, who received the Nobel prize for medicine in 1913, and who died in Paris on December 3rd at the age of 85, will be remembered chiefly for his discovery of the phenomenon of anaphylaxis, in 1902 — a phenomenon which also came to the notice independently at about the same time of Theobald Smith. He was a member of the Institute and of the Academy of Medicine. He was born in Paris on August 26th, 1850, and obtained his M.D. degree at the School of Medicine in 1876. In 1887 he was appointed Professor of Physiology and Medicine at the Paris Faculty. It was in this year, a year before the foundation of the Pasteur Institute, that Richet, who was then studying the treatment of tuberculosis, practised the first injection of serum upon a human being. He is reputed to have been the founder, with Héricourt, of serotherapy.

His discovery of anaphylaxis marked a decisive advance in modern medicine, for which he was awarded the Nobel prize. He found that a subject who had withstood the injection of a given quantity of toxic substance might succumb to a later but much smaller dose of the same substance, and this cleared up many mysterious cases of intoxication and explained, in particular, the occurrence of sudden death after repeated and successful administration of serum. His "Dictionary of Physiology," begun in 1895, is a comprehensive study of the whole subject. In the course of his long life he became latterly deeply interested in the subjects of psychology, aeronautics and pacifism. He was also a novelist and playwright.

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VETERINARY INSPECTION IN BEDFORDSHIRE

The General Purposes Committee of the Bedfordshire County Council recommended to the Council, at a recent meeting, that, for the purpose of carrying out the inspection of dairy herds, a whole-time veterinary staff be established consisting of one chief veterinary officer, two assistant officers at commencing salaries of £400 each plus £150 travelling allowance; also one second class clerk.

Alderman Arnold, who moved the adoption of the report, said that there were at present six veterinary surgeons in the county, who if the scheme were adopted, would suffer the loss of part-time work, and might possibly leave the county. Although he was moving the report he hoped someone would move an amendment making a compromise on this question and thus retaining the services of these part-time veterinary surgeons. The estimated cost of the two schemes was £2,100 and £2,400 respectively.

Alderman Humphreys and Alderman Brown moved an amendment to effect a compromise, the former stating that the farmers wished to retain the services of the present veterinary surgeons.

The Chairman thereupon suggested that the proposition should be referred back to committee, and the Council agreed to this course.

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MONTGOMERYSHIRE GRADE "A" LICENCE HOLDERS WARNED

A threat to producers of grade "A" milk was contained in the report of the County Veterinary Committee which was presented at a meeting of Montgomery County Council.

The County Veterinary Committee reported that the Veterinary Officer had reported as to a number of unsatisfactory results of second samples taken from Grade "A" licencees. The committee decided that the Clerk warn the producers concerned and that the organiser advise such producers as to what steps should be taken to obtain improved results. They also resolved that a further sample be taken after an interval of not less than seven days from the date on which the producer received the above warning, and if this sample is below the required standard, these and all other similar cases be referred to a sub-committee, who shall have power to suspend the producer's licence and inform the Milk Marketing Board. It was further resolved that for the future the whole of the samples of milk be taken by the Officer, that Grade "A" producers be circularised as to whether they would accept the results of analyses of samples of milk carried out in the laboratory at Kilkewydd Factory, and that the Clerk ascertain from the Ministry of Health whether this procedure would meet with their approval inasmuch as there would be a considerable saving of cost and time.

The report was adopted without comment.

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DISHORNING CATTLE: USE OF AN ANÆSTHETIC

Arising out of a case recently heard in the Irish Free State, in which a District Justice imposed a fine of 1s. for the dishorning of cattle

without the use of an anæsthetic, but dismissed a charge of cruelty in connection therewith, it will be of interest to state that until 1919, the law in England was settled by the case of Ford *v.* Wiley in the Queen's Bench Division in 1889. It was held that to dishorn cattle by sawing off the horns close to the head for the purpose of slightly increasing their value and for convenience in transport, was unjustifiable and unnecessary, and was therefore cruelty.

The Court of Justiciary in Scotland and the Queen's Bench Division in Ireland refused to follow this case on the ground that dishorning cattle when performed skilfully and in the usual manner for the purpose of preventing injury, was not an offence under the Cruelty to Animals Acts.

In 1919, however, the Animals Anæsthetics Act was passed and it applies to both Scotland and Ireland as well as England. By the provisions of that Act it is an offence punishable by a fine not exceeding £5, to dishorn cattle over one month old unless the animal during the whole of the operation is under the influence of some general anæsthetic of sufficient power to prevent the animal feeling pain. The Animals Anæsthetics Bill was referred to a Select Committee of the House of Lords, and before that committee a number of veterinary surgeons appeared to give evidence, their evidence being generally in favour of the Bill. Mr. Finlay Kerr, who spoke for the Department of Agriculture and Technical Instruction for Ireland, was emphatically opposed to the practice of dishorning, his only point being that it would be expedient to defer the operation of the Bill in Ireland for two years. Mr. Wallis Hoare also expressed his opinion very strongly against the practice of dishorning cattle.

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COMPULSORY TREATMENT OF WARBLE-FLY INFESTED CATTLE

At a recent meeting in London between representatives of the Ministry of Agriculture and Fisheries as regards Great Britain, the Ministry of Agriculture for Northern Ireland, and the Department of Agriculture for the Irish Free State, agreement was reached, in principle, on the question of the desirability of the issue of an order requiring compulsory periodical treatment of cattle infested with the warble-fly maggot, beginning in the spring of next year. It was also agreed that the draft of an Order to this effect should be submitted to the several Ministers for approval.

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H.M. STATIONERY OFFICE PUBLICATION

The undermentioned has been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses: London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

	Price Net. s.	d.	*Post Free.* s.	d.
Agricultural Research Council:— Spahlinger Vaccine in Northern Ireland. Observations by the Tuberculosis Committee on the Experiment with, November 12th, 1935. (88-2102-0-35)	0	2	0	2½

H.M. Stationery Office, Belfast

The undermentioned have been published on behalf of the Government of Northern Ireland. Copies can be purchased directly from H.M. Stationery Office, at the following addresses: Belfast: 80, Chichester Street; Edinburgh: 120, George Street; Manchester: York Street; Cardiff: 1, St. Andrew's Crescent; London: Adastral House, Kingsway, W.C.2, or through any bookseller.

	Price Net. s.	d.	*Post Free.* s.	d.
Public and General Acts:— Ch. 23. Diseases of Animals (Therapeutic Substances) ...	0	3	0	3½
Statutory Rules and Orders:— 128. Slaughtered Animals (Compensation) Act (N.I.) 1928 (Suspension of Charges Order)	0	1	0	1½

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Stationery Office (Dublin) Publications

The undermentioned have been published on behalf of the Government of the Irish Free State. Copies can be purchased directly from the Government Publications Sale Office, 5, Nassau Street, Dublin, C.2.

	Price Net. s.	d.	*Postage.* s.	d.
Slaughter of Animals Bill, 1935:— 33/35. As introduced ...	0	4	0	1
Statutory Rules and Orders:— 537/35. Cattle and Sheep (Return by Unregistered Slaughterer) Order, 1935 ...	0	1½	0	0½
538/35. Slaughter of Cattle and Sheep (Prohibitory Notice and Withdrawal Notice) Order, 1935 ...	0	2	0	0½
563/35. Therapeutic Substances (Saorstát Eireann) (Amendment) Regulations, 1935	0	2	0	0½

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LIVESTOCK AS BASIS OF FARMING

"The best basis for Great Britain's agricultural policy" was the subject of a paper by Mr. A. G. Street at the annual meeting of the Farmers' Club. Mr. Street selected animal husbandry as the highest common denominator of the industry, and the one best suited as the base of a national policy. Animal husbandry, or livestock, would continue in his view to be the best foundation for a national policy for the next 50 years. In 1931 British farmers obtained in sales 72 per cent. of their money from livestock, 2·18 per cent. from wheat, 6·13 per cent. from total grain, 3·25 per cent. from sugar beet, and the remainder largely from market garden produce, hops, and a little from hay and straw. The steady increase in livestock in past years had not been helped by any political action. On the contrary, it had taken place in spite of all legislation to hinder it. In other words, it was a natural economic change.

Contending that a prosperous animal husbandry in this country would grow as much or more grain than the country was at present growing, Mr. Street said that one of the most hopeful features of British farming to-day was this increase in arable grass-stock farming, by the use of carefully grown temporary leys. It was admirably suited to our climate, gave the flexibility

to our farming which was so important in case of war, produced the greatest bulk of produce, employed the greatest number of men, and bade fair to become a new tradition in our farming.

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THE INVESTIGATION OF CANCER

In connection with the twelfth annual report on the work of the British Cancer Campaign, also noticed in *The Veterinary Record* of the same date, p. 1463, *The Lancet* of November 30th, 1935, says:—

"The experimental study of cancer tends to concentrate at present on two main problems: the changes in the cell that lead to neoplasms, and the factors that bring about these changes. The work of Professor E. L. Kennaway and Professor J. W. Cook at the Cancer Hospital has shown that it is possible to produce cancer by the repeated application of pure chemical substances, closely related chemically to the sterols; so that we are on the track of changes by which substances always present in the body can be rendered carcinogenic. An investigation is being undertaken, for example, at the Cancer Hospital on the way in which excessive sunlight will cause epithelioma of the skin—an investigation which raises the question whether ergosterol (the source of vitamin D) may not be converted by light into a slightly different chemical compound which induces malignant change. In Manchester Dr. C. C. Twort and his colleagues find difficulty in distinguishing the mechanisms that lead to dermatitis from those that lead to cancer; in their view cancer 'is a defensive process, and not a purposeless, useless process as defined by early pathologists.' Suggestive evidence is brought forward, moreover, from the Mount Vernon Hospital that 'the growth rate of the tumour cells may alone determine innocence or malignancy.' At Leeds the possibilities of inhibiting the neoplastic process are being further explored, and Dr. I. Berenblum reports that cantharidin as well as mustard gas will interfere with the carcinogenic action of tar. These two substances have totally different chemical constitutions, and it looks as though the inhibition was associated with a special type of cell change rather than with chemical structure of the inhibitor.

"One of the noteworthy advances of recent years has been Professor McIntosh's demonstration at the Middlesex Hospital that in fowls tar-induced tumours can be propagated through filtered extracts. This brings carcinogenesis in mammals into some sort of relation with the filtrable malignant tumours of birds, which behave as though produced by a virus. Some of Professor McIntosh's tumours have now passed through 30 passages and they are held to show the characteristic metabolism of true malignant growths: 'in the case of the fowl it appears, therefore, that carcinogenic agents act only as stimulants of proliferation (hyperplasia) and that their action is ancillary to malignancy and not the cause.' Professor E. Mellanby brings forward experiments showing that the filtrable agent of a Rous sarcoma attaches itself readily to the normal cells of the body. Meanwhile information about the nature of these filtrable agents is being derived from another source. The method of high-speed centrifugation which has lately led to striking advances in our knowledge of the viruses of infectious diseases has been applied by Professor McIntosh to filtrates from sarcomas, and by spinning these at a rate of 40 to 60 thousand revolutions a minute a concentrated residue has been obtained, showing that the infective agent is particulate and therefore probably a virus.

"On the clinical side of pathology it is interesting to find a not unfavourable report from Birmingham on the vanadic acid reaction introduced by Bendien. The investigators believe that 'although the reaction is not absolutely specific for carcinoma, it affords a very helpful means of estimating the patients' response to therapeutic measures, and is of definite prognostic value.' The report also contains an account of important work on the spread of malignant tumours of the bowel, which is being done at St. Mark's Hospital. Dr. Thomas Lumsden at the London Hospital continues his endeavour to prepare effective anti-cancer sera and similar attempts are being made at the Middlesex. At Sheffield Professor Mellanby holds out hope of its being possible to make use of the toxic action of cobra venom on cancerous tissue and simultaneously antagonise its harmful effects on tissues by means of anti-venom serum. Renewed efforts to increase the influence of X-rays by injecting substances which will make a tumour more sensitive to them are being made at the Middlesex Hospital, with promising results, and in many parts of the radiological front there are other small advances to report. At St. Bartholomew's Hospital it is proposed to instal an X-ray apparatus with a voltage of a million; 'the amount of radiant energy produced by such a machine will exceed,' it is said, 'that of any form of radium "bomb" at present in use or designed.' Also from St. Bartholomew's Dr. W. M. Levitt presents striking results in the treatment of carcinoma of the œsophagus with large doses of X-rays—a method whose usefulness is unfortunately limited by the danger of damage to lungs. At Newcastle and elsewhere preliminary work is being done on the action of short wireless waves on the living cell. These are only a few of the directions in which inquiries are being pursued, and no one can read the report without astonishment at the diversity of knowledge—much of it from unexpected sources—that is now being applied to research on malignant disease."

Correspondence

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

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HUMAN TUBERCULOSIS: CAUSES OF DROP IN THE ANNUAL DEATH-RATE

To the Editor of The Veterinary Record

Sir,—In an "abstract" entitled "The present Status of Milk Control in the United States," printed in your issue of October 26th, milk-borne tuberculosis is defined in effect as "tuberculosis other than respiratory" and it is strongly suggested that a drop in the annual death-rate from this cause from 23 per 100,000 population in 1900 to 6·5 in 1932 is largely due to the elimination of tuberculous cattle and the increased use of pasteurisation in cities. We may reasonably object to this assumption on epidemiological grounds (of which I shall give instances) as well as because we are not told the whole truth, which is that there has been a similar drop in respiratory tuberculosis. The latter, con-

versely, may be defined, in effect, as of non-bovine origin, and this fact rather upsets the argument of Mr. Frank.

In the latest publications of the Year Books of the Dominions we read of a steady decline in human tuberculosis in all its forms and the same is true of England.

The rate of decline is nowhere, it would seem, especially in favour of non-respiratory tuberculosis, except insofar as fewer children are being born in relation to the population as a whole. Contraception has played a more obvious part than pasteurisation in reducing the proportionate rate of mortality from that form of tuberculosis which is particularly associated with infancy; indeed, any discussion of present-day vital statistics as compared with those of 25 years ago which does not take full account of the modern development of birth control is invalidated.

In your issue of October 19th you published a review of the report of the Government Veterinary Surgeon in Ceylon in which attention was drawn to the freedom of the native cattle from bovine tuberculosis—"Of over 40,000 carcases inspected at the slaughterhouses only one was found to be infected with tuberculosis." But the death-rate for human tuberculosis in Ceylon for the period 1928-32 was 6·7 per 10,000 as compared with 7·9 in the United States, and 4·4 in New Zealand, 5·1 in Australia, and 9 in Great Britain where the very special measures of the U.S. are not taken and where bovine tuberculosis is prevalent

Bovine tuberculosis in the Fiji Islands (which in a climatic respect are comparable with Ceylon) is very prevalent among the European breeds of cattle which, now, are exclusively bred in that Colony, but human tuberculosis in any form is rarely found except among the native Fijiians who share the aversion of the Cingalese to drinking milk.

Taken singly, none of these facts proves any more than the single instance of the United States, but it would seem reasonable to assume from a collective consideration of them, that neither the pasteurisation of milk, nor the elimination of tuberculous cattle, is in a large measure the cause of the general decline of human tuberculosis *in all its forms* in all Anglo-Saxon countries—a decline which is proceeding with remarkable uniformity, irrespective of local or national differences in the treatment of milk or the elimination of tuberculous cattle, in response to the constant factors of contraception, social reform, and public health work on the potential sources of human infection. If there is one other factor that may be helping the civilised nations to eliminate human tuberculosis it may well be an increased resistance to the disease, induced by centuries of response to bovine infection, as a very recent, very incomplete and by no means constant protection from the bovine bacillus. If there is any truth at all in this assumption it may appear in future generations of city-bred people who in course of time will have lost that resistance to tuberculosis which now distinguishes the human family so strongly from the apes and the bovine species.

Yours faithfully,

WAKEFIELD RAINEY.

Victoria,
British Columbia.
November 12th, 1935.

Errata.—In our notice (**15**, 46, 1386) of the Proceedings under the Diseases of Animals Acts for the year 1934, Part V, Veterinary Laboratory, it is erroneously stated that 440,036 doses of fowl *cholera* vaccine were issued. This should read "fowl pox vaccine." The Ministry does not prepare a fowl cholera vaccine.

In Mr. G. O. Davies' "Contribution on the Pathological Aspect of Sterility in the Shire Horse," line 12, col. 1, p. 1486, *for* "the adrenal gland (the source of insulin)" *read* "the adrenal gland, a portion of the pancreas (the source of insulin)," etc.

Diseases of Animals Acts

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 16th to 30th Nov., 1935	18	18	2	163	1	1	36	84	70
Corresponding period in									
1934	22	24	9	1,405	3	5	45	103	42
1933	11	11	—	—	3	4	71	55	56
1932	17	17	2	61	5	7	25	44	28
Total 1st January to 30th Nov., 1935	338	391	50	11,787	92	211	372	1,860	1,119
Corresponding period in									
1934	355	401	61	7,653	109	181	587	1,631	916
1933	268	314	87	7,805	125	213	435	1,296	857
1932	309	375	17	1,343	117	180	259	1,467	721

NOTE.—The figures for the current year are approximate only. § Excluding outbreaks in Army Horses.